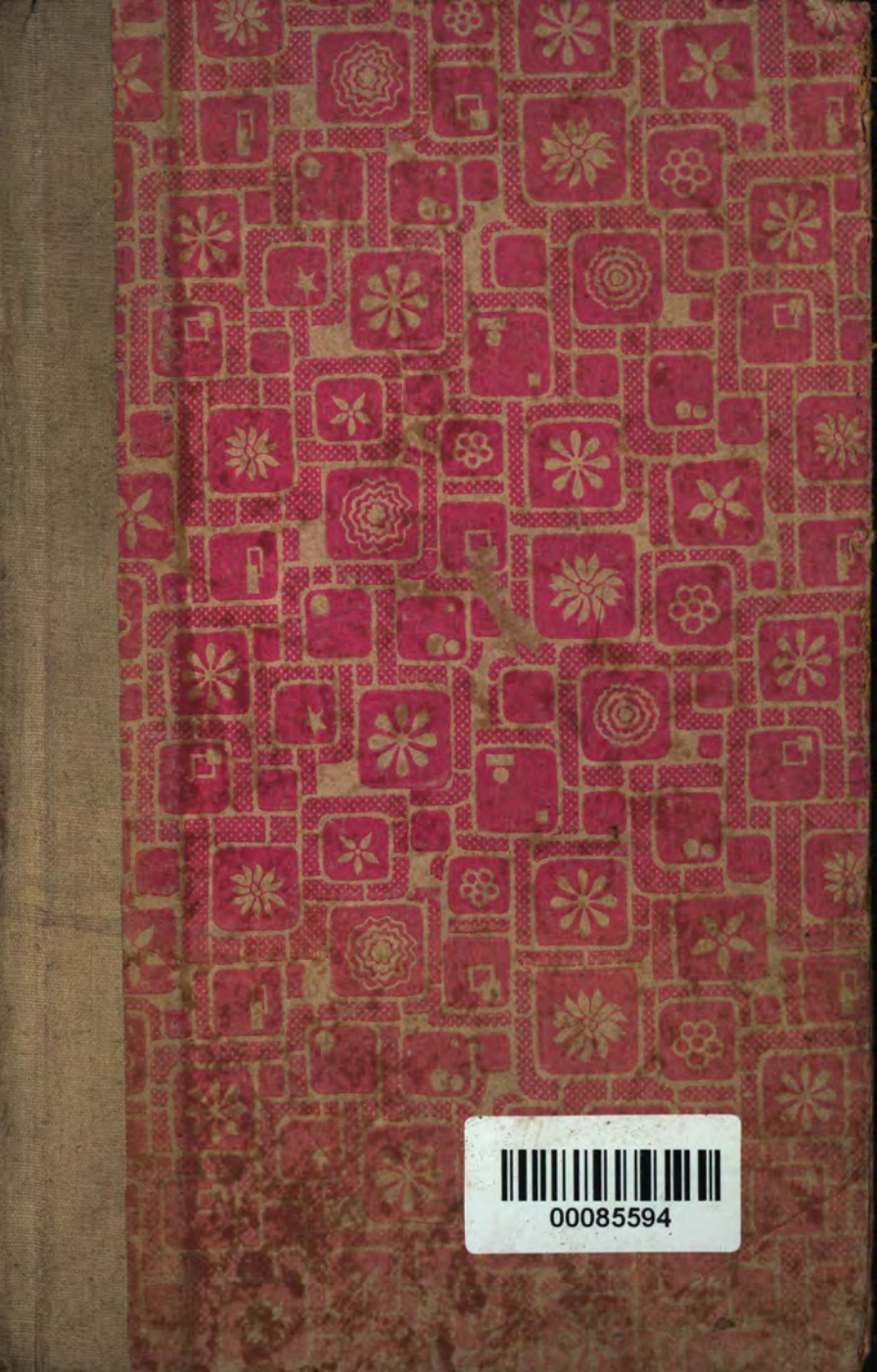
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THE

# LAST OF THE ARCTIC VOYAGES;

BEING A NARRATIVE OF

## THE EXPEDITION IN H.M.S. ASSISTANCE,

UNDER THE COMMAND OF

## CAPTAIN SIR EDWARD BELCHER, C.B.,

IN SEARCH OF SIR JOHN FRANKLIN, DURING THE YEARS 1852–53–54.

WITH

## NOTES ON THE NATURAL HISTORY,

BY

SIR JOHN RICHARDSON, PROFESSOR OWEN, THOMAS BELL, J. W. SALTER, AND LOVELL REEVE.

IN TWO VOLUMES.

VOL. II.

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THE

# LAST OF THE ARCTIC VOYAGES,

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## CHAPTER I.

Return of Osborn.—Arrival of Despatches.—Fate of Bellot.—Statement of Survivors.—No account of Western Division.—The 'Breadalbane' nipped.—Departure of the 'Phœnix.'—Preparations for housing.—Arrival of Shellabeer.—Departure of Ricards.—Ventilation.—Esquimaux Huts.—Winter Fittings.—Air-pumps.—Hospital Ship.—Thermometers.—Rupture of Ice.—Loose Ice.

*September* 15.—FINE; temperature 17°, with sharp westerly wind; the outer ice in motion down channel, but our icemen report large lanes of water can be traced outside of them. At nine P.M. the 'Pioneer' was secured, but too near.

On the 17th, 18th, and 19th, officers were sent in advance, to relieve the return-sledge, under Lieutenant Osborn. Eventually Lieutenant Cheyne, with a sledge-crew of seven men and seven days' provision, was directed to advance two days, and there deposit two days', to remain until the fourth day, and then retreat for further instructions to Cape Osborn. Had he not then appeared, I intended to send Commander Richards

with the ice-boat before rejected. I had not quite determined I would not take her myself, and, if I had not lent my own crew for the service, most certainly would have done so. This left me very uneasy and unhappy,—all confidence at an end; not at all satisfied that if the ice should part from the shore, a sledge can get along the land; Mr. M'Cormick says *not, decidedly*. This difficulty of abstracting eighteen men from our force is really alarming; better not undertake such service until we have a lower temperature!

*September* 21.—Mr. Allard reports this evening that he had proceeded so far in advance, that Mr. Cheyne's sledge was beneath him, but not within sound of his voice; that he commanded the range southerly, but no traces for six miles at least.

*September* 22.—Under this impression I felt it unnecessary to push my advance officer to a lengthened march today. Preparation was made to forward the ice-boat, commanded probably by Commander Richards; but about 3.30, much to the astonishment of every one, Mr. Herbert's signal, at the advance look-out, intimated the approach of the party, and in a short time the sledges were in sight from the ship: opinions varied,—some deemed the period short. The time however warranted the journey having been made; the distance done was trifling. Telescopes tell strange tales, and it was soon evident that despatches had arrived, part of which the leading officers, Lieutenant Osborn and Mr. Herbert, carried.

Shortly after, Lieutenant Osborn announced three important events:—the arrival of Her Majesty's steamer 'Phœnix,' Commander Inglefield; the total loss of the

'Breadalbane' transport; and the melancholy death of Monsieur Bellot, Lieutenant de Vaisseau, in his attempt to reach me with the mails, all of which had been fortunately rescued.

The two last unfortunate facts solved all the doubts as to the Halkett's boat and pieces of wreck found near us. The 'Breadalbane' had been nipped, and in a few minutes was nowhere to be seen; yet portions of her boats and wreck had been traced thus far, even since the 21st of August,—a drift of fifty-six miles!

The fate of Bellot,—admired by all, the untiring supporter of Kennedy, a volunteer again with Commander Inglefield, and the intrepid adventurer in this case to carry our despatches even up to Cape Hogarth,—cut off, not by any immediate disaster common to his crew, nor even in their sight, but had slipped down between the hummocks and was no more seen! a most mysterious, incomprehensible death! He had been substituted for Commander Pullen, whose duties (Commander Inglefield having started before his arrival, to seek us by the western shore) required his presence on the spot. The boat (Halkett's) was provided by the 'Phœnix.' This melancholy event occurred on the 18th of August, at the same moment that we were also in jeopardy.

It appears, from the very incoherent statements of the men who accompanied Lieutenant Bellot, that near Cape Grinnell the ice exhibited a heavy crack, opening rapidly, and they were engaged conveying the contents of the sledge to the shore by means of Halkett's boat, when, having secured all but the sledge, the ice drifted off, Lieutenant Bellot desiring them "to let go the line."

Two men, William Johnson, Ab., and David Hook, were then with Lieutenant Bellot on the detached piece of ice. Johnson gives a most incoherent tale,—loses sight suddenly of Lieutenant Bellot, and supposes him to be drowned between the opening of the floe,—sees his stick, and shouts out for him by name. He then states, that he traversed spaces amounting to *ninety miles* (thirty to Cape de Haven, thirty to Cape Hogarth, and thirty back,) in *no time*, and yet, *by the watch* of Monsieur Bellot, at eight P.M. on the 18th they were adrift; at night, on the 19th, rejoin their companions, a march ahead! On the other hand, the evidence of the boatswain's mate differs widely: he was on shore, not included in the catastrophe, which might have affected the minds of the two blown off; he was therefore in a better condition to see, to judge, and to report *truly*, and dates and facts confirm his evidence. By his account, he watched for them six hours; he then travels to Cape Bowden, for which I will allow six hours more, and then suddenly finds them advancing on land and almost within hail!!

Now, it must be remembered that the misfortune occurred on the evening of the 18th of August, about eight P.M. by Monsieur Bellot's *watch*, and yet, on the night of the 19th, the *party* had reassembled, after a pretty fair land travel (irrespective of the absurd history of ice work at Cape Bowden). But what appears still more incomprehensible to my mind is, two of the most distressed of the party were left behind by their companions to die, starve, or for what purpose is not indicated, and these reach the 'North Star' on the 21st, where their statement is taken.

The receipt of despatches, private letters, newspapers, etc., occupied us closely until long after midnight, and afforded, for some days, matter for serious thought. That most pressing and most important, was the entire dearth of information respecting the Western Division, and, from all the information brought to me, there was neither an indication, nor any hope, of open water in the direction of Barrow Strait; however, we are now too well aware, even from heights greater than that of Beechey Island, that water sufficiently open for navigation may pass totally unperceived at ten miles to the southward of the island; and, looking to probabilities, it is just possible that the very cause which pressed the pack to us in this direction (viz. the gale of the 18th of August) would have left open water to the other vessels, by skirting Leopold Island and sticking to the southern shores of Lancaster Sound, by which Sir Edward Parry, Sir James Ross, and others, have easily effected their passages as late as September. Indeed this is the only reasonable chance at a late season, as the main current sweeps along that coast with great force, driving Sir James Ross, I am informed, forty miles to windward during a strong gale! Even if the 'Resolute' did not proceed, I think it probable that Commander M'Clintock, with the Intrepid,' and having on board the crew of 'Investigator,' would naturally cling to that shore, and, finding access to Beechey Island impossible, move on to England. Such indeed would be my wish; but this I do not now think probable, as Commander Inglefield found the entire Strait impeded by ice, and, from the effect of south-east gales on the ice, driven from Prince Regent Inlet, it

would of necessity, after pressing on Beechey Island and closing this channel completely, bar entirely any exit from Barrow Strait. It is also clear to my mind that the drift up this channel must have been unimpeded, from the undeniable evidence afforded by the pieces of the 'Breadalbane' found in this neighbourhood.

The history of the loss of the 'Breadalbane' has already made its appearance in the official despatches, but it may not prove uninteresting here to record the event and dates.

Early on Sunday morning, the 21st of August, a little after four, the first warning of "nip" was noticed on board the 'Breadalbane,' by the groaning of beams, creaking of bulkheads, etc., which drove the crew on the ice in rather unprepared garb. No time was afforded to save anything. In about fifteen minutes the vessel was destroyed, much to the astonishment even of the spectators from the 'Phœnix,' who came to render assistance. The 'Phœnix' herself had rather a severe nip, and will have their tale to tell, if they reach England safely. I am happy to say, that the most important of her stores were saved; but her coal, landed on such a dangerous, and to us inaccessible, station as Cape Riley, may never be available! If we have such a season as that experienced in August, 1852, it may be possible to remove it, but that is too much to expect.

On the 24th the 'Phœnix,' having seen more perhaps than was agreeable of this "*yachting climate*," departed for England, taking, unfortunately, but a very summary account of our motions; and I fear, from where Commander Pullen last saw us and our unaccountable ab-

sence, she will convey but gloomy intelligence of both Divisions, particularly as Commander Inglefield, by his letter to me, seemed to have imbibed some unfounded notion of my intention to return to England this season. Their Lordships however will clearly perceive, from the despatches, that no such idea ever entered the minds of Captain Kellett or myself.

The 'North Star' exchanged great part of her crew, obtaining nearly a new set of officers and men from the 'Phœnix;' and the history of her adventures last season will doubtless be magnified into something grand and sublime, perhaps got up for amusement at one of the minor theatres, and frighten the loving wives of some of our married men. But it is indeed no matter for joke; we have yet a dreary winter to go through, and, even if the 'Breadalbane's' fate does not befall us, it is not improbable may have to abandon our vessels, and seek refuge at Beechey Island. It is much to be regretted that amongst all the proposals so plentifully showered on the Admiralty for the benefit of this Expedition, no one thought of proposing *a house*—not even Commander Pullen—by the 'Isabel,' last season. It must ere this have occurred to many in England, that before August next there may be many collected at Beechey Island who may require shelter, and that the same or a worse accident than that to the 'Breadalbane' may again visit the 'North Star,' or indeed every vessel of this Squadron!

*September* 24.—Here we remain. Every hour convinces me that screw steamers alone, not sailing vessels, should be employed on this service. Had we been possessed of adequate moving power, this Division would, in

all probability, be at Beechey Island, or possibly Pond's Bay, where, from the intelligence lately furnished by Commander Inglefield, as to his meeting with a tribe from that locality, it is highly probable that information of a highly important character might be obtained from the natives, particularly as to whether the 'Erebus' and 'Terror' had been *seen sailing out of* Lancaster Sound. I have also strong hopes that Captain Penny may be able to afford further light on this matter from the natives at the Clyde, where, had our Squadron been released, it was my intention to winter, taking with me Mr. Miertsching, the interpreter of the 'Investigator.' The Navy List, and an official letter received by Commander Osborn from the Secretary of the Admiralty, announcing his promotion, although no notice reached me direct, induced me to give him an acting commission; and Mr. Ricards, Assistant-Surgeon of this ship, for duty in 'Pioneer,' received his acting appointment as Surgeon of the 'North Star,' *vice* Mr. M'Cormick, gone home. Mr. Toms, assistant of this ship, lent to 'North Star,' was ordered up to do duty in 'Pioneer.'

*September* 27.—The ice had now thickened considerably, and some few preparations were made, but not without suspicion, towards housing, but with express injunctions that "the tilt covering must be ready to furl at any sudden emergency." The interior house-framing and building was still proceeded with. Late as it was, I did not feel authorized to proceed further until the spring tide, about the 3rd of October, which would, I imagined, afford us some criterion as to the security of the ice.

From the tenour of my despatches to the 'North Star,'

I daily expected the arrival of Commander Pullen, in order to arrange with him respecting the final winter and spring proceedings. He had already made one attempt, but, bad weather threatening, had put back, as the open water led him to suspect that the western ice might break up, and permit the 'Intrepid' or 'Resolute' to reach Beechey Island.

On the 30th however Mr. Shellabeer, Second Master, arrived with some few parcels and service letters, informing me that Commander Pullen expected to be able to quit on the 1st of October. I had already given Commander Richards intimation that, so soon as all was safe, I should despatch him, with two sledges, to make the necessary arrangements, if Commander Pullen did not come in person; from him also I expected to obtain a more complete idea as to the requisite force intended to be pushed over in the ensuing spring, in order to relieve and extricate, if necessary, the men of the Western Division. This arrival however relieved us of one sledge. Lieutenant Cheyne and Mr. Ricards would return by this convoy; the former to attend to tidal and meteorological observations, under Commander Pullen. The first sledge left on the evening of the 1st of October, under the command of Mr. Grove, to bring back the assistant-surgeon for 'Pioneer.' Mr. Shellabeer, with Dr. Ricards, would wait for my letters until the morning of the 2nd, and overtake the others before night. I still had my misgivings of the weather, and more than once thought of advancing a boat. Mr. Shellabeer had also reported, "strong gusts down the valleys," and "open water extending from Cape Osborn to Union Bay." It was for-

tunate he did not start, as originally intended; a smart gale from north to north-north-east sprang up, attended with heavy snow-drifts, which rendered travelling imprudent. Our leading party, under Mr. Grove, had doubtless "bagged," and were enjoying their comfortable rest in the tent, under shelter of some of the high land to the southward. It is strange that human beings will attach the idea of enjoyment to such unmistakable discomfort. I do not think it is confined to any rank; I recollect when I was young enough to be of the same disposition,—life in a jolly-boat was preferable to inactivity in the most comfortable cabin; I think however that that period has passed.

The gale has had no further effect than to disturb one of the huge masses of ice to which we are secured (?), and, as it grounded at low water, caused it to rend, which was attended with considerable noise, added to some slight alarm as to its deranging our present comfortable bed! As it occurred at the moment some of our crew were depositing the sweepings of the decks at the dirt-heap, it occasioned some little fright to the individuals concerned.

On the weather moderating, on the 3rd, Mr. Shellabeer, accompanied by Mr. Ricards, departed under the customary cheers on promotion. We now began to fancy that the ice had attained sufficient solidity to defy any later gale of this season, and, gradually relaxing my opposition to housing, I had now permitted it to advance progressively, until at length we had secured our boats in board on the skid-beams (seven feet above deck), and the covering was laced down. But I was a man persuaded

against his will,—I could not shake off a most incomprehensible feeling, which internally informed me I was *wrong;* I became very nervous, irritable, and excitable; opposition seldom cures such complaints. At every turn of tide our safety hummocks were disturbed, and the vibration touched a corresponding chord in my wakeful disposition.

'On the other hand, I was also anxious to complete, at the earliest prudent moment, before winter became inconveniently obnoxious, my intended scheme of rendering the ship warmer and more comfortable than last season; but this could not be effected until the *housing was finally secured.*

As these remarks relate especially to my own views of winter protection and arrangements, it may be as well to warn those not interested in the discussion of such dry subjects, that they occupy one or two pages. I imagine that hitherto we have been in error as to the principles which should be observed in such arrangements. Taking into consideration the experience which I have had, derived partly from personal opportunities, partly from the records of each Arctic adventurer,—I mean, of those who afford us a proper estimate of Esquimaux habits, and the effect resulting to their constitutions;—further, upon some little experience upon the modes of life among the North Americans, Russians, Dutch, Danes, etc., I have arrived at the conclusion, that so long as a supply of pure air can be introduced to sustain the fires in their proper duty, and the healthy respiration of the beings confined between decks, all that is required is effected. Now, part of this duty is to demand fresh air, and to

cause it to flow in *only* by proper prearranged openings, which will inevitably result, as a natural consequence, if the openings are conveniently adapted. The fire produces heat, or, as a natural result, consumes air. I will not mystify the question by dealing with the gases, etc.,—these can be followed naturally by the initiated. I am writing simply for those who care not for the *rationale,* but wish for *facts* and proofs resulting.

It is not requisite that this pure air should be of such a low temperature as to cause, not only unpleasant, but unwholesome condensation and inconvenience to the lungs of those compelled to remain between decks; nor do I consider it, from my personal experience of last year, at all requisite to have *extra holes* to admit the cold air, when it defies our efforts to keep up a convenient or comfortable temperature. The idea of ventilation may drive a man too far—even to absurdity, and unconsciously induce disease at the moment he fancies himself the promoter of health. But we have nothing to do with robust men and their powerful lungs; we know that we have some very weak lungs; indeed we fear the result of this winter, and more particularly if we should be as damp between decks as last. Even at the moment I pen these remarks, I am told that in every direction, and before half our trial is prosecuted,—and we have already experienced a pretty good taste of damp in August and September,—"the lower deck is infinitely drier and more comfortable!"

I cannot lose sight of this excess of ventilation without stating that I enjoyed good health, had a dry cabin, but more cold air than I could keep out, disturbing my rest

completely. This, I contend, is not healthy,—is unpleasant, and repugnant to reason. It will naturally be asked, Of what use was our warming apparatus? The Sylvester did not act satisfactorily; it could not overcome the cold between decks, and the heat refused to travel to the cabins abaft the mizen-mast. Now in order clearly to comprehend my scheme, it is necessary to observe that the action of cold air is a direct downward pressure; that may be proved any frosty day, by standing a piece of funnel vertical, and another inclined at 30° from the perpendicular: the rime, or hoar-frost, will mark the disc in the vertical tube; but what is the result in the second? Every part of its vertical shadow, so to speak, supposing a vertical light, will be protected from any deposition. On the other hand, hot air will flow upwards at any angle of inclination. If Mr. Sylvester, or the workmen he employed, had duly considered this, his principle might have been carried out; but he will find few captains of moderate ability who would bring their ships two feet by the head simply to neutralize, or perhaps make good, bad arrangement (accident may do this, of which hereafter).

Now the Esquimaux, although perhaps illiterate, are a very shrewd, sagacious set of people; of this we have many undeniable proofs in our museums. They fully comprehend, or at least act upon, the laws relating to cold, and therefore, in the construction of their winter habitations, take great care to place the entrance below the level of their flooring of the main chamber (possibly, in those most complete, three feet), and furnished with a long, low, arched passage, compelling the occupants or

visitors to creep on their hands and knees until they gain the entrance to the inner chamber by a sort of step. Such were those of Western America, at Cape Lisburne delta, Icy Cape, and other places visited by me, and such are those at the Danish settlements of Lievely and the Whalefish Islands. The interior is dome-shaped, and the height admits of the breath ascending sufficiently to condense aloft without causing annoyance to those within. At the apex of the dome a square slab of ice is placed (in summer, a frame covered with skin); but in one I examined (deserted) with Mr. Collie, we noticed the action of Nature to carry off the heated air by fine grooves in the ice plate, as if cut by design, and possibly affording some degree of ventilation when the wind penetrated by the same. But to our object. The principle with them is to obtain dry, heated air, and this is effected solely by a lamp and animal temperature; the result is, that they are comparatively healthy, and no scurvy is noticed. It is true that their eyes suffer, from causes not well ascertained.

The principle of hot, dry air, even with salt food, and that not of the best quality, appears to overcome the scorbutic tendency among the civilized people to whom I have alluded. I do not recollect one single case, nor have I been able to find any recorded by others; and I made it my peculiar study to ascertain what diseases prevailed at every place visited by me in the Northern Pacific.

Now, the first, and very serious, defect in all these ships is the want of sufficient height between decks; and yet, if a vessel is taken up to convey troops or passen-

gers, to the Equator, or to Quebec, in either cold or hot weather, the law demands, and the Emigration Officers take care, that a certain height shall be available between decks. This, be it remembered, is simply for security from ordinary disease, as well as comfort. Surely we, who have to live in these vessels for years perhaps, require it more, where vital interests are at stake! The evil however principally lies in pushing out these ships, and determining the command at the latest moment,—when the consent of Parliament for the outlay may be obtained,—or possibly to save the expense of a few weeks' wages!

To fit a ship properly for this service requires something more than a seaman's head. These vessels were ordered by the Admiralty to be fitted with air-tight sections; but this was not satisfactorily, or trustworthily, executed; indeed the steamers were not close ceiled; however, had I known all the requirements before I left England, I could easily, with our own resources alone, have remedied them. Most certainly I would have hatched, instead of decked, the hold-beams; I would have made preparation beneath for placing the hatches during winter on the level with the Sylvester apparatus, and thus ensured a space sufficient for the escape of noxious air and damp from the lungs. These fittings would have strengthened the ship considerably at the expected position of nip. The great evil we are infested with—the immediate condensation of the breath on the beams—would thus be obviated.

On this true lower deck I would have shifted the range or cooking galley during winter, which, in addition to the

direct heat of the Sylvester, would tend to preserve a more equable and genial temperature. These two great fires at the lower level would, it is manifest, materially purify the air from the hold upwards; and their funnels should be so constructed as to carry off, by outer casings, all superabundant heat to the upper condensers, and thence horizontally, within six feet of the deck at the hatchway; but manifestly, *not perpendicularly*, and exposed to intense cold, such perhaps as would not allow vapour to ascend! By such an adaptation we should obtain full and healthy play for the lungs, and then even a colder, but dry, atmosphere would not perhaps be objectionable.

But as at present or hitherto arranged, the heat derived from the expenditure is contemptible. Let the scientific reader picture to himself the radiation from the galley fire impeded by a tinned bulkhead or casing to the fore-companion, distant but three feet and a half from the fire; further, that a constant volume of cold air rushes down this companion, condensing in visible clouds as it passes to the sides,—not a very pleasant position either for the unfortunates of the mess which is exposed to the blast from that door, which, on deck, is merely shielded by a tilt awning, old, threadbare, of last cruise, and this frequently left open for ventilation! Also no radiation, and the steam arising from cooking, struggling to escape by various channels, condensing in cavern-like drippings from the beams. At present all this is demolished, and that hatchway sealed! the radiation now reaches where it should, and is sensibly felt by the messes on each side; but the steam, where has it gone?

Above this galley, and immediately over the fire, an opening has been cut, furnished with a hinged hatch, serving as a valve and affording a vertical ascent to the steam; but this steam escapes into a fitted steam-chest including the funnel, which has an outer casing also, to aid the direct escape from the fore part of the coppers: this steam-chest occupies a space of seven feet square. Thus far one great evil is remedied; that is *un fait accompli*.

I now proceed to what would have been my arrangement had all these matters been duly reported on by our predecessors. I blame them not,—they are not engineers; it has not been with them, as with me, a kind of hobby. But one most important consideration, involving the safety and comfort of ship and crew, would have been adequately prepared before leaving port, and the housing become eventually but a very minor consideration. I think I hear some of the old Arctics exclaim, What will he be at next? But patience, my friends.

Cold, I have asserted, descends vertically, in preference, and if your chimney has not been provided to meet this, you must expect it to tumble into your fire and negative its value. Who ever dreams of entering his house by the chimney? yet we sailors undoubtedly pursue this most absurd principle in this very oppressive climate. This must be remedied; we cannot conveniently cut an entering port in the side, but, if requisite, it might be done, at great inconvenience, in the bow or stern: however, the evil is to be remedied, and I trust, even with our slender means, to effect it (when it can be completed) in such a manner that the ship may even

be *worked at sea* with her new fittings, which I consider indispensable, when properly complete.

I have, in the first instance, closed all the hatchways but the main and my companion hatch, which will also be secured. Between the fore and mainmasts, at the height of our skid-beams (seven feet), one compact house, covered in at the roof, is complete,—battened, caulked, and will be canvas-covered. Over the main hatchway, receiving the vertical heat of Sylvester's stove, is a square cabin (which includes the chain holes), seven feet in width, and adapted with a door, closing by weight and pulley. The entrance door is on the starboard side, some yards before this, and an additional canvas screen intervenes, thus breaking any cold air which might otherwise enter. Overhead, the vapour hatch in the awning remains, in order to facilitate the escape of the vapour from beneath the awning, but its hatch prevents the vertical descent of cold air. The fore steam-chest, including the great galley valve or space between the funnel and main hatchway, and forming a commodious cabin, now furnishes the seamen's washhouse; and here they can perform this very important operation well and without fear and trembling, and other evils of which I shall presently have to speak. All vapour here arising from hot water is carried off. I thus obtain three immense condensers of the vapour arising from the main hatchway, and any air passing down will be very much deprived of its killing cold virtues before it meets the warm ascending current. That no air incapable of combustion may flow down to the Sylvester, the pipe is contained within this after-cabin, and warms its air before it descends from a higher level, cut off from the vapour by the canvas lining.

I must now revert to the practice of last year, to which I submitted, because "it was so before," for quiet's sake. Will any one credit that I was so simple? Read and judge.

The washhouse was on the shore, distant about two hundred yards. Here the consumption of fuel was *lost*, as it did not aid in heating the ship: it was cold and comfortless. It was quite impossible that the clothes could be properly washed and wrung: they were brought on board frozen. Where were they sent to be dried? Thus charged with ice and moisture, they were sent to the *main hold*, to be dried by the aid of the Sylvester. The main hatchway being closed, where did the vapour escape? To the lower deck. Again: the officers and men bathed in warm water; all this was also diffused, and no vent! The main hatchway at present, owing to the rarefied state of the atmosphere, enables this vapour to escape. It was remarked during last winter that the wettest place in the ship was around the mainmast: the water ran down upon the chronometers! Why? Because the after-companion, alternately open and shut, threw down such volumes of cold air, condensing these warm vapours, seeking the nearest escape, that of necessity nothing but wet could result.

In the present condition of the Sylvester, at the keel, aided by the warm current of air ascending, I hope to maintain, throughout the winter, a temperature not under $+32°$, or the freezing-point: at all events, never as low as 32° to 62° *minus*. The air, before it can descend, will be of a temperature better adapted to support combustion and maintain a high temperature, simply on the

principle of the use of hot air, not very long introduced (within my own recollection) into the blast furnaces. One thing must be evident, viz. that in the same proportion as the combustion is increased at the keel, so must the foul air be consumed, the vessel dried, and the ascending warm current maintained; all acting with unerring certainty, to produce the greatest degree of actual circulation of air, so much to be desired. Before leaving England I applied to have the pumps fitted expressly for air-pumps, in order to draw off daily all the foul air from the limbers. The order was given by the Admiralty; but difficulties equal to refusal were started, and so disheartening, as to prevent further prosecution of the plan. However, I caused Downton's pumps to be worked daily for this object, and I am satisfied that they materially assisted my views.

Of the after-part of the ship I will now explain, that the Observatory, not being required, by reason of the uncertainty of our communication with the shore, was, to prevent its destruction, put up complete, so as to include the after-companion leading to my cabin, with the door at its after-end, so that no cold air could pass by these doors, one being closely shut before the other could be approached. This position was one of the miserable defects of last season; everything around the mizenmast froze; the after gun-room bulkhead, forming one side, was constantly coated with ice, and the temperature of my cabin could not be maintained, falling at night as low as $+18°$. All this has already been obviated, and this previously ice-bound passage is now *warm*. I am quite satisfied that this could have been completely fitted

in England, and that the ship could have been safely navigated here and back, if necessity required, *without its removal;* indeed, I would retain the entire framework, as not at all inconveniencing the deck stowage.

But still further to preserve on the upper deck a pleasanter promenade, and to take off the sharpness of admitted air, I propose to form a level ceiling overhead by the inverted boats and old canvas; over this, the housing; and beneath all, when grim winter is unmistakably established, the further protection of all the spare sails, forming also, laterally, an inner curtain, thus producing another artificial deck, of a temperature some degrees higher than in its ordinary exposed state. But all this would be inefficient, if the entrance was left accessible to any intrusive breeze. Our *entrée* is therefore quasi-Esquimaux, by a portico from the floe, having the ascent leading forward to a landing below the gunwale, previously fitted for our accommodation ladder. This leads, by a rectangular inner porch, to the gunwale, thence descending to the deck, where mats will be spread, instead of the one foot of snow and gravel of last season, to preserve warmth and dryness, and prevent the slumbers of those who can command pleasant dreams from being disturbed by the drum-like sound of every constitutional pacer of the icy deck. No trouble will be spared; but until we are safe, the greater part of these measures cannot be completed.

The sick, who during the last season were subject to all the inconveniences I have stated, have now been removed to the midship section of the 'Pioneer,' where greater height, a powerful Brodie's stove, and detaching

them from the main body of the crew, will, should this second winter produce more serious cases, afford an immediate and available hospital. Up to this date, but four of the crews, amounting to ninety-one men and officers, have been considered objects for removal; but several cases of severe catarrhal fever, resulting probably from the first effects of condensation between decks, have occurred; but evidently selecting those predisposed, particularly among the crew of the 'Pioneer.'

Today the thermometers have been placed under the small boat, inverted and suspended to our driver boom, affording a free current of air through them, at four feet above the floe edge. These are registered at the hours of eight A.M., noon, and four P.M.,—the standard spirit and minimum every two hours.

*October* 10.—The day proved beautiful; calm, sun brilliant, and temperature 15°. I had become very fidgety about our return sledge, as well as the non-appearance of Commander Pullen, accompanied also by a strange, oppressive, unaccountable feeling. Ascending the hill above us about four P.M., I noticed a suspicious dark streak on the distant floe, apparently, to my comprehension, a lane of blue water; but the Ice Quartermaster declaring it to be mere fog, I was relieved from anxiety, and as it indicated nothing which demanded further investigation, it passed unnoticed—*but not forgotten.* About ten P.M. the breeze freshened considerably, and before going below for the night, I jocosely desired the officer of the watch to "Call me, if the ice parts at the bow, and take care that the 'Pioneer' (the wind being aft, and her bowsprit pointing over our beam, not many yards distant)

does not run foul of the ship." Little did I dream of the immediate prospect of any such danger; but many similar random observations have been treasured up, and if burning for sorcery be still a legal sentence, I may become a victim! Hardly had I reconciled myself to my bed, when the officer reported, "the ice has broken off within a few yards of the bow, and is going off rapidly." I was at that moment thinking of our dangerous state, with the housing over and not secured, boats stowed, and too many provisions on deck, choking access to the hawseholes, no cables bent, and every chance of a capsize. I certainly was in no mood to turn out and redress myself again on such a night, and go through all the necessary preparations for safety: however, not a moment was to be lost. I was soon on deck, but not without difficulty and much tardiness could I get the hands up to bend cables.

Few could credit the reality of our predicament! For four hours, anxious hours, were they engaged clearing the provisions away from the bows, and securing them abaft. At two the cables were bent, the wind had shifted to south-south-east, and blew in hard squalls off the land; we were sealed in ice about a foot and more in thickness, and moreover were secured by hawsers to the grounded ice within shore; considering her safe for the present, I allowed the men to rest by watches, until daylight, when provisions and every available weight were struck below, to give her stability; the fore-part of the housing was directed to be furled, and the ends drawn down, to prevent the wind getting under. The topmasts and lower yards were struck, and every precaution adopt-

ed, which the prevention of confusion or our limited force enabled us to "*do well.*" The awnings could not have been removed without our entire force; and calculating on their present smooth and inclined surfaces, I considered that the wind would have infinitely greater force on the unequal surfaces of boats and other objects exposed to its action. I therefore determined to keep that close, to prevent any ingress of wind, and I much regretted having disturbed the bow housing, for the difficulty and confusion it created was manifest. Power was to be husbanded; it required too many men. If the ship broke out before the deck load was stowed below, I must confess that I feared the result! Axes as well as saws were in readiness to fell the masts: but they were of *teak.*

Few of those who possibly may read this (if it ever reaches?) will conceive that anything selected to carry a pendant and to encounter Polar navigation could be so unseaworthy; yet just at this moment the croakers informed us that "her former skipper came down to Woolwich, to see her turn the turtle," and that he was nearly gratified; but we had embarked fifteen tons of ballast at winter-quarters, had on board twenty-eight tons of water and forty-six tons of coal, all stowed low, together with stores and provisions for two years! Yet her situation, even thus prepared, was one of extreme doubt and danger! I cannot really say I felt so sure of the latter expression; if the anchors held and she rode fairly, head to wind, there was no danger, so long as they availed us! If driven from them into the pack, why then we must take our chance. In this condition, with our hatches

battened down, we awaited the result. Surrounded by all these threatening dangers, our thoughts were still on the bright side, and we derived some comfort from the probability of our improved condition, should the ice again form, and leave us a smooth surface for spring travelling.

Parry (Third Voyage, p. 17) observes of bay ice:—"*September* 9, 1824.—This phenomenon, to the extent to which it occurred, was to me a new one, and there can be no doubt that, had the temperature continued low for two or three days together, while the sea was thus covered, a sheet of ice would have been formed, too solid to have again dissolved the same season; it was impossible therefore not to apprehend, at times, that a continuance of weather so unseasonable might expose us to the unpleasant dilemma of being frozen up during a winter in the middle of Baffin's Bay."

At any close harbour, even at our late winter-quarters on the 18th August, 1852, and later, at Port Refuge, in August, 1853, this reasoning might hold; but where tides, winds, or currents prevail, there is no need of the sun, or even of water of high temperature, to remove the thick bay ice: wherever the wind can act on water, and the tide-ripple obtain play and find the slightest crack, it is astonishing how greedily the former seizes the advantage, rips up the ice, weather as well as lee, and causes its almost magical disappearance.

That high temperatures are indeed our enemies, and not to be despised, we have but too good reason to be assured; but until the general surface of these Straits, or even of Baffin's Bay, ceases to offer any open water, any spaces for ice to *move in*, or weak points on which

the breeze can impel the great surface of ice, miles in extent, to press, nip, buckle, or yield, the wind will do its work, and that fearfully. That no temperatures or late dates can be reckoned on to free one from this liability, we have but too much reason to be convinced. We were almost harboured and locked by berg-pieces* aground, with the following sufficiently low temperatures:—September 9th, 2·5°; 18th, 0·0°; 20th, 5·0°; 28th, 1·0°; October 7th, −9·0°; 11th, +20·0°. The outer young bay ice had been accumulating, forming, as we deemed, a complete sea-guard, and this ranged between ten and fifteen feet in thickness at sixty yards from our bow. The bay ice under our stern, averaging nine inches, was apparently blocked securely within by the great masses grounded outside in six fathoms: who, under such circumstances, would have a suspicion of danger?

The wind, at south-east, rapidly increased in strength directly off the land astern, which, ascending by terraces, attained an elevation of about three hundred feet in a mile, or possibly, from the nearest beach, about one hundred feet in one hundred yards. There was no direct acting power on the weather ice but the wind and reverberatory wave. Little did we dream of treachery from within! But surely, though gently, did this latter subtle and oscillatory power take advantage of every crack which the gaping of the great opening from north to south, or parallel to our beach, now enabled it to enter, causing sufficient swell to set the whole floe in undulatory motion. Mass by mass freed itself, and, grinding

* Not literally berg, but ice aground in six fathoms.

against each other, drifted away, leaving our vessels adhering to the bare edge of the in-shore bay ice; still we thought that our stern hawsers, secured to heavy masses of grounded ice, would retain her. But no! the signal for desertion was followed too closely; piece by piece dropped from us, like blood from our veins, leaving us, waterborne, afloat! Even the grounded pieces followed the example, denuding the surface, even to the very beach! All was confusion, and that considerably heightened by a heavy snow-storm. Once more the ship was reduced to the seaman's care, and to trust to her ground tackle; but until the loose ice left the bow clear, no anchor could reach the bottom; the breeze shortly effected this, impelling the ship forward with such velocity that it became doubtful, in such deep water, whether the anchor could bite the loose, gravelly bottom. It bit, held, and now the crisis!—she took her "trial lurch;" it was deep, and the men were much frightened; the water came in about five seams within the water-ways, but I had witnessed the 'Samarang' go even further. That was enough for me; I was satisfied all was safe! At that instant my thoughts reverted to our absent sledge, as well as to the fate of poor Bellot. In such a gale, similar in every feature, did that gallant Frenchman meet his fate!

But to our position. Notwithstanding she rode to her cable, she did not "right" satisfactorily, but remained with a most inconvenient heel to starboard. I cannot say that I expected her total loss; she was securely battened down, and, doubtless, would have "righted," had she been relieved of her masts, etc.; but the lurch she

took was so deep as to cause all hands to rush to windward, and some one was indiscreet enough to open the weather curtains. I was soon there, and had them secured.

All were soon reassured, and went to work cheerfully, completing various duties; it continued to blow hard, with heavy snow-drift, and our anxieties were freshened occasionally by huge pieces of drifting ice getting across our cable, grinding our sides, and threatening my friend Glaisher's nursery of thermometers, still suspended under the stern, and causing me infinite anxiety.

For thirty-six tedious hours were we retained in this state of suspense, with the additional uncomfortable reflection that any sudden shift of wind, bringing the main body of western ice down upon us before we could get our anchor, would send us high up on shore. The windlass levers, having bent, were inadequate to perform their duty properly, and we had *none spare!*

## CHAPTER II.

Moor in-shore.—Open Water available.—'Pioneer' prepared for service.—Return of Pullen.—Interpretation of Instructions.—Thoughts of abandoning 'Investigator.'—Limits of Travelling Season.—Return of Grove.—Instructions to Richards.—His Proceedings.—Deposits Despatches.—Reaches the 'Resolute.'—A Bear and Buck shot.—Cutter in danger.—Returns to the 'Assistance.'

About 4.15 A.M. on the 13th, it lulled, and at six it had moderated sufficiently to get the boats out and make fast our hawsers to our old berg-piece, which we found had retained its position, and from which, deeming ourselves protected from seaward by the barrier floe, we had too soon withdrawn our hawsers. Truly glad were we again of its important aid, and, lifting our anchor, we succeeded in recovering our old position by noon. Between the remaining pieces which had withstood this gale, and up to the beach, all the bay ice had "cleared out." Very tempting docks were offered, and, had they been rock, probably we should have availed ourselves of the chance; but the crush, if they moved, was too foolish an experiment. Our anchors were now let go. Determined to hold on by this shore so long as our means permitted, and to prevent further mischief by driving in

shore, I considered that the only chance of saving vessel or crew would be taking the ground as early as possible after any adverse movement drove us from our anchors. We therefore considered our outer anchor as in reality lost if the ship should be beached, and, under such circumstances, no longer required; but, if the events of the spring should offer floatation and release, that it was well laid out, and beyond the chances of damage from floating ice. Here then we secured; anxiously praying for that intensity of cold which alone can render us securely frozen in or comfortable for the winter. What variable mortals we are,—at one moment yearning for warmth, at another for intense cold!

During our temporary detention alongside the great berg-piece, I had an opportunity, favoured by the beautifully transparent state of the water, of examining its base, and even to detect every article at the bottom which had fallen overboard. I now ascertained that it was a much more important mass than I had anticipated; it formed an irregular pyramid, having a very broad base or flat pedestal, apparently well imbedded in the tough clay bottom, the depth on its seaward side affording six fathoms and its inner three. I therefore felt that I could now trust more confidently to its friendly offices in warding off any infringing floe or loose pack, at all events taking the worst before it molested us.

At this period I contemplated, now the sea was open, making an attempt to reach Union Bay, and, had the services of the 'Pioneer' been available, most certainly would have made the experiment, even against the chances of being caught midway; but, unfortunately, I

had given permission to unpack for the winter, and before her machinery could be effective, affairs had assumed a different aspect. It was fortunate that I did not; as upon a more minute inspection of the western ice, manifestly in motion, I felt satisfied that it was still too close, and we should probably have been hampered within ten miles of our present position.

Many concurrent reasons induced me to be in readiness to move, should Nature again offer an escape; and one perhaps of those uppermost in my mind was to prove how late and at what degree of low temperature steamers could act with effect. With such feelings I directed the 'Pioneer' "to prepare for service." Of course many observations were hazarded on the time required to complete such a duty; but these only proved, to my mind, the necessity of placing such questions beyond mere opinion, and thus afford me sure grounds on which to base any future orders. Eventually, after some little conversation with the Chief Engineer (Mr. Harwood), he considered that he could place his engines in action within sixteen working hours, and, much to his credit, within that interval, in so far as the machinery was concerned, she was reported efficient. About the same moment the light bay ice had recommenced forming; but the breeze still kept open clear lanes of water, the temperature ranging between 19° and 22°.

*October* 13.—This evening, and whilst these matters were in progress, two persons were reported to be advancing by the beach from the southward. Anxiously alive to any accident to our sledge parties, it naturally produced a little excitement; but this was of short du-

ration, as it was soon made out that Commander Pullen was one, and a boat was sent to bring him on board. Commander Pullen had been obstructed by water at a bluff about six miles southerly, where he had left the sledge and remainder of the crew, bringing on one man. Lieutenant May was immediately despatched with the cutter, and before ten that evening the party was safe on board, having, as they termed it, "been reduced to lummes for the last two days." This great hardship our poor fellows would most gladly have submitted to without a murmur; but those who had been revelling in mutton, salmon, and ducks, might reasonably fancy inferior food a deprivation.

From Commander Pullen we obtained satisfactory intelligence of our sledges, having met them within two days' march of Beechey Island, and free from further obstruction, should they prefer the land journey. Thus, in the course of a few hours, have we experienced three important causes for gratitude! From the report however of Commander Pullen, it proved that he had experienced a narrow escape, possibly from a similar fate to that of poor Bellot. He had incautiously taken to the floe, encamped, was caught by the gale, which levelled his tent during a snow-storm, and eventually had barely time to regain the land ice before it separated. These constant liabilities prove how imperative it becomes to provide boat-sledges or Halkett boats,* for service in autumn. The question is not what an officer may choose to risk in his own person, but what degree of confidence

* These Halkett boats are invaluable on any service, but, it occurs to me, especially so for the conveyance of wounded, arms, ammunition, etc., across streams.

a Commander can entertain, and even of ultimate reproach to be heaped on him, should any fatal accident overtake a party despatched by his orders, unprepared.

From the report of Commander Pullen as to the state of the ice in the lower channel, and also of the dangerous coast-line, on which the vessels might probably be nipped, between Cape Osborn and Beechey Island, even if they escaped nearer dangers, together with the opinion, that, should any such accident befall, no such shelter as was here offered could be afforded, I determined at once that, unless driven by stress of weather, or by other causes over which I had no control, I would not risk the destruction of all by any blind movement.* Nor was it simply our immediate safety that was now to be considered; I was here the Commander-in-Chief of this disjointed Expedition, and the lives of all would be required at my hands. Of the Western Division I knew nothing beyond the jeopardizing of sixty additional souls belonging to the 'Investigator;' indeed all might be in extreme difficulty or even extinct! Upon our efficiency, as well as that of the 'North Star,'—and last season had proved her insecurity,—all now depended; caution therefore became imperatively necessary.

Properly to comprehend my position, none but the Powers who sent me forth could understand; next, the simple reading of my Instructions clearly indicates, that, by the advice of the Committee of October, 1851, (page 2, paragraph 4,) the safety of the crews was to be my *main* consideration; page 5, paragraph 18, is to the same effect; and the concluding matter reduces my final

* Later events proved this decision to be correct.

operations to the spring of 1854, supposing even that I am assisted by Nature. The new orders of this season rely on my judgment,—for what?—*zeal* in the prosecution of common sense operations, but *determination* where it bears on the *abandonment* of the Expedition, "unless *you* see *reason* to think differently;" implying simply the powers accorded to me throughout. Stores indeed were sent to Beechey Island, but for what end? Not to prolong service *here*, but to place in depôt *there*, for those who might arrive at Beechey Island, *ourselves included!* for to bring them here, or to send them to aid the Western Division, required an express Expedition for this object and no other! People in England forget to reason on this matter. Let it even be imagined that the 'Phœnix' and another vessel had been sent out complete, to replace part of my Squadron, what would have been the result? They could not have been moved beyond Beechey Island, and would have remained there idle, shut up at that position!

Upon the 6th paragraph of the latter Instructions it was my duty to act, and totally irrespective of the opinions of any officers but those around me *and known to exist.* Accordingly my views were discussed with Commanders Richards and Pullen (the former next in seniority to Captain Kellett), and, without adverting to their special opinions,—which coincided with mine, or were even literally more decisive as to obedience to my orders to return,—I came to the conclusion that nothing like uncertainty, or indecision, upon such important matters, would be deemed by those who selected me for command as satisfactory.

In this matter I had to deal with subjects involved in doubt and intensely perplexing. Had it been possible for me to communicate in time last season, I should instantly have determined on the abandonment of the 'Investigator;' indeed, *privately*, I had reason to understand that it *must be*. Doubtless my "Geographical" opponents in England scouted the idea; but Her Majesty's Government had entrusted to my keeping the public interests, and I felt too well assured of the decision which they contemplated. I had for years looked this matter seriously in the face; I had put very searching questions, in 1850, into the possibility of ice moving between Melville Island and Banks Lands, and, with perhaps too strong a conviction that it never would break up, unless by some extraordinary effort of nature, or possibly under an incomprehensible season, came to the conclusion that extrication, without any hesitation, would have been my course, —that officers and crew would now be safely in England, and I should have received the thanks of their Lordships and the public. That no twenty men would be found mad enough to volunteer, I felt confident; indeed I should strongly suspect the saneness of those who might, unless indeed for bombast, knowing it could never be carried out. But one object, in my mind, could warrant any such devotion, not to any proof of north-west passage, but to one infinitely more akin to the high, honourable, and philanthropic feeling of our profession,—the relief to, and extrication of, their missing Commander-in-Chief, Captain Collinson. But in none of the records can any such feeling be traced; it is mere matter of endurance, in order to solve the geographical question. The alter-

natives left were, "If twenty men volunteer to remain with Commander M'Clure, in the 'Investigator,' then all her remaining crew, together with that of the 'Resolute' (exceeding thirty-eight men), were to be sent home in the 'Intrepid;'" but the lateness of the season, the delay of carrying out such plans, must of necessity in some measure delay the 'Intrepid,' ordered to call at Beechey Island, and where I had hoped our invalids would have been added, for two lives here were very precarious. On the other hand, if twenty men did not volunteer, then the entire crew of the 'Investigator' would abandon the vessel, and return in the 'Resolute' direct to Beechey Island.

Such were the contents of the communications forwarded to me, and, whatever may have been the result, we were absolutely in the dark, and my decision for future action must be determined without reference to Captain Kellett. It was apparent, from the information brought by Commander Pullen, that no chance of further information, although possible, was at all probable this autumn: the ice, both easterly as well as westerly, had been completely stationary since the end of August.

The probabilities of disaster, under this scanty information, were threefold. We had before us the disastrous gale of the 18th of August, 18th of September, and also that recently experienced on the 11th of October; and the further additional cause for disquietude, should Captain Kellett have sent the 'Intrepid' forward alone, with scanty supply for her increased crew. Other considerations also intruded, and matters, which find no place in the public despatches, left me not quite at ease: this

principally regarded the 'Investigator;' the fourth winter must tell deeply on her debilitated crew, and, should they fail, who would be selected for the opprobrium? As to our own condition, our thoughts scarce dwelt upon it, but we could not help recurring to the probable effect of the gales we had experienced on our Western Division, and reflecting that the force is generally increased in more southern latitudes. On one point however we derived some little consolation, in the probable deflection, or break, upon the peculiar coasts between Melville and Beechey Islands, converting our south-eastern and most violent gales into a north-western in that region. Such indeed I perceive to be the fact during Commander Richards's journey to the south-west: he experienced uncompromising gales from north-west, with few gleams of sunshine, whereas, in my own journey to the north-east, we were basking in the sun's rays and enjoying light southerly or easterly winds; with this material difference however, that he was murdering defenceless deer and musk-oxen, luxuriating in the fat of the land, when we, but for the Queen's allowance, were comparatively starving. Under the before-mentioned difficulties, I had to decide on the means to be adopted for *relief*, as well as the *ensuring obedience* to the wishes of Government.

As it would be imprudent at the present moment to make arrangements which our own condition might derange before the spring, I deemed it prudent to draw up the necessary instructions for Captain Kellett, and to appoint Commander Pullen to proceed with them, after the receipt of my final despatches, which would be

forwarded to him in February or March. Commander Richards volunteered, but there was ample time before the period for starting arrived, to determine upon the possibility of sparing an officer of his rank and of so much importance, should accident befall me.

Commander Pullen was further instructed, should it be found practicable, to forward a party this season to Cape Hotham, as well as Assistance Bay, where a depôt, containing provisions for ninety men, had been established by Captain Kellett, and endeavour to obtain tidings of our missing vessels, or to aid any persons he might fall in with in reaching Beechey Island.

The temperatures of October—even of November—are so much above those deemed fit for travelling, that we may, taking last year's tables as a guide, reckon upon $-5°$ to $+21°$ up to the 10th of November, and from the 10th until the end of the month principally $+18°$ to as low as $-22°$. The travelling temperature is deemed $-30°$, at least so the frost-eaters would wish us to believe: we see but little of their faces on the floe, unless well muffled up, even at zero. Under these considerations, the journey across and back, by the 'Assistance' men, would occupy about ten days; but as most of the crew of the 'North Star' have been changed, are new, untried, and not to be compared to our picked men, I consider that double that period is yet available.

The duties which now require our consideration involve the security of all valuable instruments and documents, and depositing them safely at Beechey Island. The sledge parties detached from hence in the spring will be charged with one portion of this duty, taking

with them a heavy load of ship's books, logs, private journals, instruments, etc., and after due rest and preparation at the 'North Star,' will eventually be told off for our new and exciting search westerly. Thus far indeed the supplies saved from the 'Breadalbane' become of considerable importance, as many of the most important necessaries for travel, including fuel, etc., have been entirely expended in the operations of last season.

Under our contemplated duties of laying out depôts, it is more than probable that it will involve the necessity of extending them even as far as Melville Island, and that a second Division will follow up another search on the southern shores, where Captain Collinson's parties have also to be sought, and supplies for their sustenance deposited.

The entire distance between Melville and Beechey Islands, we are now aware, has been travelled by Mr. Roche, attended by invalids, in twenty-two days; but as westerly winds prevail, and offer much greater impediment, particularly in March, it will be necessary to allow thirty as the shortest under the then very low temperatures.

In accordance with one article of the late Instructions I had fully determined that one vessel should be left near Assistance Bay and at Cape Capel, should it be found practicable. My calculations would enable me to throw across, by our entire force, about 2500 rations,—and should the water open early and release the 'Pioneer,' possibly about 2500 more in July, leaving about 5000 rations, or three months' for sixty men. These, including the depôts left by Captain Kellett in his advance in the autumn of 1852, would, if no intelligence had

been received relative to Captain Collinson, fairly provide for his retreat upon Beechey Island, where a house, possibly a ship and provisions, would sustain him until further relief would be forwarded. In all these operations I felt quite assured, from the tenor of my late despatches, that further assistance would reach Beechey Island before the end of July next, and by those vessels I fully expect either intelligence of the safety of Captain Collinson, or full instructions for my guidance, with reference to his ultimate safety.

All these matters had been fully discussed, committed to paper, and read over to Commanders Richards and Pullen; the most important papers and journals were forwarded, and should accident occur to us, Commander Pullen was fully instructed as to his duties.

*October* 17.—About two P.M., accompanied by Mr. Loney in the 'Hamilton,' to aid him in his journey round the water-washed points, who would also escort back our own sledge, he took his departure under a temperature of 22°; the ice still very tender, occasionally breaking, but admitting of repeated journeys with light loads only to the shore. As our depôt at Cape Bowden, near to the position where poor Bellot met his fate, was supposed to be stale or injured by open weather, ten days' additional provision was forwarded to make good that station.

This event, nearly the closing act of the season, caused no little excitement, for to some of the gloomy anticipators of disaster, "the last letters" seemed to indicate a belief that our next purpose would be to seek relief at the 'North Star.' Under such feelings, jauntily as the 'Stars'

parted, under "the customary honours," on their southern march, there were many of our party to be noticed, loitering with a vacant gaze, a last wave of the glove, and possibly a frozen pearl to set the eyelash in motion.

*October* 20.—Shortly before noon the 'Dauntless' banner announced the advance of Mr. Grove, one of the most cheerful and light-hearted of our party, and before night I had the gratification of feeling that all my officers and crew were again collected, and comfortably housed. This was our final chance, my last hope for the season of any communication from the Western Division. If accident should have arrested one, both, or all three of the vessels near Cape Hotham, it was some consolation to know that they would find there a boat, should water be available, to aid in their journey to Beechey Island.

Our minds have been so much engrossed by startling and active events, that the present pause affords me the first available opening to refer to the contents of Commander Richards's proceedings, from which I have extracted the following.

In order to understand the nature of the orders under which Commander Richards proceeded, I consider it expedient to give them the precedence.

ORDERS

*By* EDWARD BELCHER, Kt., C.B., *Captain of H.M.S. Assistance, and in Command of the Arctic Squadron.*

1. Whereas it is expedient that a special examination of the south-western shores of this great opening into the Polar Sea should be made by sledges during the present season,—and having every confidence in your ability and zeal to carry out this important measure,—and further, Lieutenant Osborn, commanding Her Majesty's steam-tender 'Pioneer,' having in the handsomest manner, and with his customary zeal, volunteered to support you in this arduous duty:

2. You are hereby directed to take under your command the undermentioned sledge crews, and, accompanied by Lieutenant Osborn, proceed, *viâ* the depôt already established at Cape Lady Franklin, to vigorously search the points in succession towards the position agreed upon with Captain Kellett as the Rendezvous of 1853, viz. lat. 77° 0′ N., long. 105° W., or the nearest coast thereto, where I fully anticipate you will precede that party.

3. This duty effected, you will deliver to any officer whom you may chance to meet there, or deposit in cairn, in conformity with my General Order, failing to meet any one, the despatches addressed to the Secretary of the Admiralty, as well as those for Captain Kellett.

4. Proceeding with the run of the land then in sight, I must trust to your own judgment in prosecuting the great work of our Expedition, viz. to search not only for our missing countrymen, but also for any traces of cairns, drift-wood, or other indication of the missing Expedition having entered this sea by the Wellington Channel; also, any traces of the Expedition under Captains Collinson and M'Clure.

5. You will bear in mind that unless the state of the ice should render it probable that the sea had at any period within the last ten years been free from ice, and been in motion at the entrance of any bays, inlets, or channels, that no valuable time should be expended in their examination for the vessels. Your own judgment will point out any other chances of the crews having sought refuge there.

6. If any opportunity occurs, by sight of divergent objects, which may render it expedient to separate, you will take the northernmost and westernmost, and Lieutenant Osborn that to the south-west, taking especial care that your Rendezvous is so securely fixed and understood by both parties, that no possible mistake, misconception, or disappointment to either party shall accrue.

7. The general Instructions to the sledges which will escort and remain by you for stated journeys are already clearly set forth; you will therefore, as you detach them, countersign each order furnished to them, adding any further directions which your experience on the journey may render expedient.

8. You have been fully provisioned for this important service; no thought or caprice has been forgotten: indeed, I feel that the minor matters of detail have rested within your own province.

9. Up to the period of detaching your last commissariat sledge you will insert your "state and condition" on the last detached orders of the officer commanding that sledge, and you will of course exchange any men that seem unable to hold out.

10. In the pursuance of this duty I must urge on you the necessity of system, forethought, and precaution, which although probably unnecessary, is nevertheless one part of my duty.

11. You will yourself keep a strict daily journal of every occurrence, and cause the same to be done by every officer under your command; the same to be delivered to me within a reasonable period after your return.

12. This Expedition is especially, in addition to that of the search after our countrymen, one of science; and I need not remind you how much its pursuit tends to sharpen the wits, as well as to wile away many hours of otherwise sluggish indolence or sleep, when snow-storms, or low temperatures, may confine you to your tents.

13. I do not expect from you sledge-loads of fossils, or whole carcases of mastodon or megatherium; but sketches, records, etc., will not much encumber your head, and some waistcoat-pocket specimens may serve to determine important desiderata in the field of science. I will not say more: perhaps I have said too much. "A word to the wise is sufficient."

14. Should you meet with any officer superior to yourself, you will of course show him these instructions; but he is hereby strictly forbidden in any way to interfere with your command, route, or proceedings.

15. On the other hand, should you fall in with any other your inferior in rank, you will inform him of your intended route, give him (if sent on the same) a divergent one, as the interest of the service may point out, or instruct him to seek and carry back the despatches, should you already have deposited them.* This last duty you will consider paramount to any other route, of which you will then be the best judge.

16. It is needless for me to exhort you or Lieutenant Osborn to do anything but *return securely*, and without allowing your own high feeling to be the standard by which those who labour under you are to be urged forward. It is the retrograde movement which tells on the minds and feelings of all.

17. Trusting to your judgment, and to Him who watcheth over all, and with our sincere prayers for success and safety, I send you forth on your noble mission, and

Believe me, etc.,

EDWARD BELCHER.

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* It is curious that even this should have so unmistakably occurred.

With a sealed public letter, to be opened if any superior should meet you, read, and exhibited to him, but to be returned to me *unopened* if no such cause for its use presents.—E. B.

The extract from the official letter reporting proceedngs explained, as extracted in page 48, the general movements of Commander Richards in the search, and the cause for his deviation from his original Instructions. Having now before me that part of his detail of the sledge operations necessary to explain his course, which must however be followed on the chart to be understood, I shall endeavour to condense the parts of most interest, using, where expedient, his own words, with the customary mark of extract.

"On the 10th of April, with the thermometer at —4°, breeze favourable, the Division sailed from Northumberland Sound.

"On the 16th reached a group of islands fifteen miles west-north-west of Cape Lady Franklin, to which the temporary name of Deception Group was given. Here the first depôt was secured, and the first auxiliary returned to the ship (Mr. Grove, of 'Dauntless').

"On the 21st reached the western termination of this group, and on the 24th reached Cape Fortune: it lies in latitude 76° 26′ N., and longitude 103° 33′ W. The second depôt was placed on this Cape."

On the 25th the 'Lady Franklin,' Dr. Lyall, returned to the ship. These two were auxiliary sledges, and belong to my Division. The others were commissariat, and on which the victualling of Commander Richards would depend until he proceeded alone.

On Friday, the 29th of April, he reached the north-

east point of Byam Martin Channel, which in itself being the discovery and proof of its being open to the Queen's Channel, and further, approaching the nearest to any accessible spot for the Rendezvous, was named Point Success. Here the despatches were deposited in lat. 76° 32′ N., and long. 105° 4′ W., being twenty-eight miles south and four west of my assigned position, 120 miles from the ship, and little more than half the distance to where the 'Resolute' wintered. Here a depôt was established, and the first commissariat sledge, Mr. Herbert, was directed to return to the ship.

Crossing the Byam Martin Strait in very thick weather he reached and landed on the north-east point of Melville Island, on the 6th of May; the position was determined to be in lat. 76° N., and long. 106° 25′ W., thus cutting off a large portion of Melville Island. Here the fourth depôt and the light boat were deposited, and Lieutenant May, of the 'Reliance,' received instructions "to proceed to the Grand Depôt at Cape Lady Franklin, revictual, deposit notice, and return with provisions to meet the requirements of the returning sledges, and enable them to make further examination of the overlooked coast on their return." Proceeding north-westerly, skirting the northern coast of Melville Island, which does not extend beyond the parallel of 76° 48′ 30″ N., he passed the Bays of Promise and Plenty, having there noticed abundance of game. Commander Richards notices that on the 11th of May "we find the night travelling very disagreeable yet; it is certainly like going back a fortnight in the season, and it takes some time to reconcile the appetite and rest to the change. It is

absolutely necessary however, to prevent the snow blindness, cold and cheerless as the nights are."

It is rather a curious coincidence that I should have altered my time of travelling on the same day, but with very different result, and our temperature at that moment five degrees lower. We were in 77° N., and he in 76° 10′, but we experienced a bright, warm sun, and our progress was easterly: evidently we enjoyed a far superior climate. He had the luxuries of game and the occasional sight of vegetation; not so with us! and immediately I notice he killed two musk-oxen, cow and calf, and not long after a deer. I cannot but pity them: they could not spare the fuel to cook them!

"Skinned and cut up the musk-oxen, one weighing 150 lbs., the other 50 lbs.; buried a part of them for our return." "The coast trending N.N.W. and about one hundred and fifty feet high, fronted by flat beaches, terminating in hummocks of pressed-up gravel, or rather soil, which is now very abundant (stones are scarce); indeed we are obliged generally to build our beacons of gravel or earth. Osborn shot a deer today, a doe, weighing about 60 or 70 lbs., which was divided among the sledge crews. The musk-calf shot yesterday was very good, no taste whatever of musk about it. We find the fire however insufficient to cook it."

On the 16th of May he reached a remarkable cape, about six hundred feet high, on which a large cairn was erected and the Union hoisted, but, as this was within Governor Kellett's province, it was merely cutting off some of his fair proportions. It was therefore decided, to appease him, that it should bear his name. The extraordi-

nary watercourses were here remarked; some of a vertical depth of one hundred feet. He observes:—"This hill is about six hundred feet high, and is cut up in an extraordinary manner by watercourses, a hundred feet or more in perpendicular depth, running in every direction. The lower land is sandstone; on the summit are large masses of lime, and, I think, some granite. Mica (at least so I take it to be) is very abundant in the cliffs which are bared by the melting of the snows. The surface soil is covered with a red and green-coloured earth, resembling the dust of copper ore." (Pray number the intervening series between the shell-bearing limestones and granite!) It is not for me to dispute these records; all have been told of their mistakes, but they determine to adhere to their adopted theories. The specimens are *selenite*.

Proceeding a short distance further, he deposits five days' depôt, for his return; blanket-cover, and specimens, to lighten their weight.

Completing his sledge to forty days from the 'John Barrow,' they move forward, parting with his last commissariat, and directing him to examine the unexplored gaps left by his necessarily rapid advance, as well as the coast up to Marshall and Goodsir's furthest.

He was now alone, and, as he observes, "The 'Sir Edward' moved on in search of new discoveries; we were full of hope, although as yet no trace of the missing Expedition had been discovered. We had examined three hundred miles of new coast, and were good for two hundred more; the people were in good health and spirits, though it must be confessed somewhat lower in bodily strength than when they left the ship (?), and we

had every reason to hope that, with the resources at our command, we should get to the westward of Melville Island, and find, at any rate, some indications of those we came to seek, should they have entered the Polar Sea."

*May* 17.—"About one P.M., to our great surprise, we crossed a sledge-track, which appeared very recent; I immediately halted the sledge, and followed them back to the eastward. After an hour's quick walking, we saw an encampment, and, on coming up to it, found it to be a party from the 'Resolute,' under Lieutenant Hamilton. The surprise of himself and his party may be imagined at being awoke from their dreams by the hail of a stranger!" The former intelligence has been already given. Lieutenant Hamilton had been now twenty-one days from Dealy Island; he accompanied him back to his tent, and finally, giving him instructions where to overtake Lieutenant Osborn, they separated. Commander Richards was then very nearly on our parallel, latitude 76° 48′ 30″, and having now reached the north extreme of Melville Island, bore away southerly for Hecla and Griper Bay, meeting with many difficulties.

On the 19th, on visiting a cairn left by Lieutenant Hamilton, he noticed "a fragment of a pine branch, about two feet long, with part of the *bark* upon it, worn and split from contact with the ice, having probably drifted from North-west America. It had not the slightest appearance of having come from a ship."

He reached Cape Mudge on the 28th; all appearances of animals ceased on rounding the north point of Melville Island, and heavy weather prevailed.

On the 31st, he had previously observed, "I feel myself, in the evening, like an iron poker, only not so strong," having sprained his ankle. This morning however another adventure occurs. He notices "a tent pitched on the land, very close; presently the inmates of it saw me, and were evidently much surprised, and doubtful as to what colours we were sailing under, knowing that we could not be any of their own parties. The officer advanced to ascertain my character, and in a few minutes I had the pleasure of shaking hands with Lieutenant Pim, of the 'Resolute.' My party coming up, we received a hearty welcome from him and his people. Lieutenant Pim, I found, had been weather-bound here for some days; and well he might be, for, except before the gale, it would have been impossible to travel." He remained one hour, supplied himself with provisions, obtained information as to his best route, and pushed on. Lieutenant Pim was *en route* to Cape Fisher, to place a depôt for Commander M'Clintock. The overland journey was attended with difficulty.

On the 3rd of June he discovered the 'Resolute' and 'Intrepid,' and "at five A.M. on Sunday, the 5th of June, I arrived on board the 'Resolute,' where my appearance (*alone*) created no small surprise. They were not prepared for a solitary visit from 'the Wellington Channel.' The ship seemed almost deserted, two or three officers only on board, and the few men I saw seemed strangers, as indeed they were, being invalids from the 'Investigator.' I received a hearty welcome, and every kindness a weary traveller could wish for. Dr. Piers, of the 'Investigator,' undertook to patch my feet up, and render me

fit for travelling in three days. Captain Kellett was absent; but Mr. M'Dougall, the commanding officer, made the preconcerted signal for his return, and Monsieur de Bray proceeded with a sledge towards Cape Bounty, to look for him. Dr. Domville was at the 'Investigator,' at Banks Land, holding a medical survey of her crew, and was hourly expected back. His report would decide the steps to be taken with regard to remaining by or deserting that ship."

On the 7th Captain Kellett returned, and was of course much surprised and delighted to learn the news and to have the opportunity of such a direct communication with me, more than any day's writing could convey. The extract of his letter has already been given. After feasting on venison, musk-ox, hare, ptarmigan, etc., all served in Christian style, he observes, "I could not help contrasting this fare with what my less fortunate shipmates are probably revelling on at present, peradventure a curried gull, or a steak of walrus or Polar bear!" Captain Kellett having delivered to him the necessary documents, accompanied him one day's march, taking him on his dog-sledge.

On the 8th of June he took leave of Captain Kellett, and travelled by the eastern coast of Melville Island up the Byam Martin Channel. He adopts the double journey, sleeping between. I cannot perceive the advantage; more is possibly got out of the men, but not justifiably. Broken sleep and double fatigue may not be detected on the light homeward journey; but, in our case, we returned heavy, did quite as much, and the men were not out of working order: no jaded countenances or

complaints, and yet we had no luxuries, no extra food. I notice that the outward heavy journey took fifty-six days, and the return, light, thirty-five days; total, ninety-six days. All evidently much the worse for wear.

On the 14th of June he discovers, at Point King, one of Dr. Bradford's cairns, and finds his latitude to agree nearly with that determined by that officer, but, he observes, "the chart is constructed nearly twenty miles at variance with this latitude. This coast is remarkably straight, being a series of very shallow bays or indentations, with the land extending some distance off them: occasionally watercourses from the inland ranges. The cairn had entirely mouldered away." Here they fell in with a bear, which was fired at within thirty-five yards, hit in the chest, charged, shot in fore and hind quarters, and fell, but before they reloaded he regained his legs, took his departure, and escaped. It was seen to fall at some distance, but was considered too lean for fuel, and therefore not pursued further.

On the 15th they killed a fine buck, the Sergeant hitting him in the windpipe at seventy yards. Although Sergeant of Marines here, he is an old campaigner in the Indian wars, being a non-commissioned officer at the Kyber Pass, and other similar amusements.

On the 16th of June he reached Dr. Bradford's furthest, where he found the cairn, constructed of stone, quite perfect. The latitude of this position is 75° 56′ N.

The entire journal is occasionally enriched with the natural dry humour of my friend Richards. As it will doubtless contribute to the customary Blue-book, I shall be cautious in my extracts, so as not to rob it entirely of

interest. He is about to encamp near the Rendezvous Bluff:—"We had our choice of ground tonight, either soft snow or soft clay; we chose the latter, as being a novelty, and as reminding us of the approach to a pig-stye in England of a November day."

Saw deer, but the men were too much reduced to care about killing them. Vegetation here was more luxuriant; but the wild sorrel, seen for the first time, even a rarity. Everything very backward; this too on the 24th of June! He observes: "There is much more vegetation however on this side of the Strait than on the other; indeed, there would seem to be a well-defined line of sterility on the north-east side of Melville Island, which appears to extend thirty miles to the southward, and nearly as far to the westward of the north-east extreme." "It is remarkable too that no animals, or traces of them, were seen on that corner. I can only account for it by the force of the north-west wind telling constantly there."

Why the Hudson's Bay guns should burst, in preference to all others, I know not, but in both Expeditions we have had very narrow escapes. Who makes them?

On the 10th of July, having reached Cape Lady Franklin, he met with the tent, and two men, left by Lieutenant Osborn, gone southerly; he is also surprised by meeting with Mr. Loney, sent to relieve him. He observes, as he is obtaining sights, "I saw two people coming over the hill, which I took to be Lieutenant Osborn and one of his party; but, to my great surprise, on coming nearer, one turned out to be Mr. Loney, from Northumberland Sound, who had been sent with a cutter to recall me, if I should have arrived, and help to carry

my people across the Strait, which I could ill have done with the small boat alone." He moves on for the cutter, and observes:—"I found the wooden waterproof tray (Forster's) answer well; it carried the sledge and gear across some wide lanes of water without giving us the trouble of unloading and putting them in the boat." Having reached the cutter, and sent her men back to assist, he and Mr. Loney were quietly having a yarn, or, in his own words, "we were seated quietly in the cutter, which was hauled on the floe, one hundred yards from the land, when suddenly we perceived the ice to be in motion, and in a few moments the floe, with the boat on it, was forced twenty feet up the steep beach, and rested on a mass of grounded hummocks. She was turned completely over, with enormous pieces of ice hanging over and about her, threatening instant destruction! There was no help at hand, and all we could do was to pick up some of the gear and instruments which had been turned out of her, and look on (looking out for ourselves at the same time). It was more than half an hour before we could recall the people by firing guns, etc., during which time the boat was being moved about among the hummocks in a manner that surprised us how she was not crushed to pieces; it seemed impossible that she could escape. The ice however stopped running, and she eased down and saved herself by a miracle, resting on her mastheads, bottom up, against the ice! I am persuaded that, had a ship been in the same position, it would have been total destruction to her. The lightness and pliability of the boat's frame was alone her safeguard; but it was an extraordinary sight to look at

her, tossed about more than twenty feet above our heads, like a nutshell, among pieces of ice twenty times her own weight, and sustain so little damage. The crew soon got her safe on the land, and we succeeded in saving nearly all the gear."

It is fortunate, perhaps, the crew were absent; some attempt to interfere with Nature might have caused loss of life or severe injury. Mr. Loney's sextant was severely injured, indeed ruined, the arc being twisted. This dose is one of the prevailing liabilities to boats and ships.

At eight A.M. on the 11th they left the south shore in the two boats, and reached Barrow Island about four P.M., both boats rather leaky. To us Barrow Island, viewed on all sides, appeared to rise rather abruptly on the low land, but Richards describes it as so smooth as to render it difficult to determine its apex, much resembling the back of a turtle. This is a deceptive point to determine, to any but a practised eye, on any very extensive swell of land. A cairn was built, and at six A.M. on the morning of the 12th of July they pushed forward, landed on Spit Island, saw the ship, and came on, reaching our floe as before stated, and bringing despatches from Captain Kellett, at Melville Island, in thirty-five days.

## CHAPTER III.

Run of the Ice.—Driven aground.—Barrier Limits.—Crystal Palace.—Reflections on Nature's Gifts.—Tidal Effects on Ship.—Last View of the Sun.—Ice lifting the Ship.—Visit of a Wolf.—Inauguration of Crystal Palace.—Frost-bites.—Increased Comfort.—Peculiar Coincidence of Temperature.—Coast-line Fissures.—Freezing beneath the Floe.—State of the Crews.—Christmas Day.—Thermometers inserted in the Snow.—Effect of Wind on Snow.

The excitement and duties attending our late flow of events has almost withdrawn our attention from our merciful escape,—not forgotten, indeed, but clouded by anticipation of the eventful future. We are indeed to be compared to the unfledged young of the tern, born and left upon the rock at the termination of the season, to perish, unless "He who all protects" extends his shield over us. Day by day events confuse all our fine-spun theories, and we find ourselves again cast upon our backs. On this, the 20th of October, and late in the season, we are as much bereft of any rational feeling of security, as in August last. Such may be our case in the November gale!

Hardly had these observations been penned, when that peculiar unmusical sound resulting from squeezing

ice, by some termed "cat agony," not much unlike the wet finger over a plate of glass, added to an unmistakable roar of moving gravel on the beach,—intimated one of Nature's movements. Oh that pen or pencil could portray on paper the extraordinary sensations, or the sublimity of the changes in but a few short hours! even minutes might have determined our fate, but it was not "His will."

The scene I will endeavour, but I fear very inadequately, to describe. I had gone on deck to witness, as I imagined, simply one of Nature's freaks, and foreseeing possible mischief, determined to aid in turning to advantage what must otherwise inevitably result in disaster. It was an exhibition—a period of command never to be erased from my memory; we were, nevertheless, in imminent danger. The outer floe was in action, pressing heavily on the shore. The newly-formed outer ice was buckling, piling, and threatening to overwhelm all within. Unless the ship could be withdrawn, and that by an inclination away from the grounded ice, she must be overwhelmed or driven ashore in such a position as to leave her subject to be rolled over on her broadside.

The hands being at their stations, a canal was most expeditiously cut with a long radial curve, coaxing, much in the same manner as in railway practice, her motion off the nearest mass of ice. I clearly foresaw that the instant her bow became pressed, the ship, acting on the ice astern, would force it under the smooth surface, and gradually help herself to a new dock. Causing our men to depress the inner pointed end, the force commenced; cable was veered, and beautifully did she glide into her

new berth, doing all the work herself, as if it had been an every-day evolution! Not an inch was there to spare. She had, it is true, imbedded her sternpost, and risen abaft about fifteen inches: the piling ice had ceased at her bow, and the cable was taut. But who shall describe the chaos without? Horrible! worse than the old nightmare floe which had been blown off. Such was

our position; and the 'Pioneer' also grounded when the movement ceased, and left us to view the effects of the external forces from which we had escaped.

Our position before this catastrophe seemed to promise not only comfort, but also security. Both within, as well as without, a fine glassy level sheet of nine-inch ice had formed up to the very beach, causing us to congratulate ourselves on the smooth travelling it would afford to our spring parties. Over this extensive white sheet but a few masses (apparently berg pieces) of ice here and there dotted the surface, and afforded safe barriers, as we had anticipated, from any pressure from without. When ice has once formed to such thickness, it is seldom that we notice more than partial disruption, and that in lines or "nips." But in the present case it was

ordained that we should witness the effect of one of Nature's sullen, certainly not silent, motions.

The first notice we had of this action was a rushing noise, caused by the displacement of the small stones at the beach and the forcing slab over slab, to perhaps twenty thicknesses. This merely broke the ice directly in contact with the coast-line. But to seaward all was confusion; slabs were turned over, forced erect, and jumbled together with quiet but appalling grandeur, each motion causing inquiry if that which you stood upon might not instantly turn upon and annihilate you!

Nature seemed to have lined out its action, and determined "Thus far shalt thou come, and no further." But the exterior ice, enraged, as it were, that it could not reach us, trembling as we might be supposed to be like mice in a trap, vented its spleen on the barriers aground, piling slab on slab until all was one chaotic confused outline, but barring us within a clear radius of two hundred yards from the shore astern of the ship, until at length it became, by its own accumulation, grounded.

This outer barrier I should imagine to be composed of plates of bay-ice, varying from nine inches to a foot in thickness, and even when grounded, raised above the mean level about twelve feet, forming a natural rampart, including the 'Assistance' and 'Pioneer' within its bounds, with a still smooth carpet up to the shore! Notwithstanding, all within was calm; and this, our second deliverance, seemed to warrant security; still, the conflicting roar of the outer ice, and the squeezing up to our bows and no further, continued to harass us much, as it kept all hands on the alert, and did not afford us relief from anxiety night or day.

We were now aground: what the next motion might effect we could only await in patience; all that human power could avail had reached its limit. In the general feeling each man thinks of himself, the Captain has to think for all; what his feelings were it is needless to describe, but the means of future security were, in his mind, uppermost. Our changes of late left us cause for gratitude and ground for hope; we were now safe from drowning.

Before this *bouleversement* the beach offered nothing but finely comminuted stones and but very little snow, —nothing indeed adapted for building. As a few hours more might compel us to seek for refuge on the shore, I landed to examine for materials. Before me Nature had, by this late act, provided amply for our necessities; the slabs of ice, all of nine inches in thickness and of every required surface, were thickly strewed at my feet. I determined instantly on the construction of a Crystal Palace, perhaps to live, like its predecessor, in history! The officers were summoned, the ground lines marked out, navvies sinking the foundations, moulds made, blocks sawn out, and the first house in Victoria Town well in progress before we retired to rest; its dimensions were eighty feet in length by twenty feet in width, its walls eighteen inches in thickness. The cement being formed of wet snow at a temperature of $-6°$, soon reduced the work to solidity, and, in justice to the builders, I must say that their work was as accurate as if Her Majesty had intended to inspect it in person; each ice-brick is cut by hand or cross-cut saws, and the building presents a very substantial appearance. The Crystal

Palace, of which I had long joked, now rose in real grandeur, under the principal superintendence of Commander Richards, aided by our trusty Boatswain,—the essence of any work to be done; always ready, master of every trade, and of an extraordinary even temper. Verily, sailors are wonderful animals!

But, amid all this mixture of fun and seriousness, for both had their alternations, can the philosophic mind fail to perceive the merciful dispensation of Providence pervading all around us? The peculiar bed, of soft plastic clay, on which the ship is grounded; the crescent of huge masses of ice grounded and cemented together, forming an outer arc constituting the present piled rampart of broken ice, momentarily increasing, and thus shielding us more effectually from further danger; and last, but not least important, the smooth, unbroken carpet within, on which we may have yet to convey our provisions to the shore, possibly to our future domicile! The terraced land itself, hitherto our unpromising surface, already smoothed and prepared for our convenience, not forgetting too the upheaved, cast-on-shore slabs of ice, without which we should have been reduced to the stores saved from the wreck. Wonderful indeed to the contemplative mind are all these matters, and all their adaptations to the ends of science. Shall it be again inquired, "What is the use of science?" Without it, all the gifts of Nature, their application, beauty, and gratitude for their enjoyment, would cease to exist! Throughout our progress we cannot but maintain, wonderful have been our pursuits, our escapes, preservation in health, etc.; these last are but a continuation of the blessings we have enjoyed.

*October* 23, *Sunday*.—At present it is calm! Another run of the ice towards the shore must decide the fate of these vessels; it may lift us quietly up, and leave us aground. It is our day of rest, and Nature herself seems disposed to permit of its enjoyment.

*October* 24.—Feverish, restless gusts from south to west still continue to tantalize us. We continue landing provision, to be prepared for the worst, as well as fuel and other necessaries; but, in my own mind, I begin to think we have seen the worst.

*November* 1.—The month of October has terminated, but still I regret to say that a dreary uncertainty seems to hang over us. The temperatures have continued high, and consequently the ice has but now attained one foot in thickness. Our principal changes seem to occur in these latitudes more at the first and last quarters of the moon, but this morning, at low water of the new, we experienced a slight shock; but, as I had long suspected the cause, it did not surprise me. It was occasioned by the falling away of the ice from the sides, on the keel taking her whole weight on the ground. This I expect to be repeated, until having at each grounding interposed a fresh layer of water when the ice detaches itself, she will gradually become lifted, and eventually completely ice-borne, free from the ground.

Our old enemy, the external floe, has been in motion during the week, and opened a space of water about half a mile outside of us, but it has again become frozen. The Crystal Palace progresses rapidly, being at present five feet above the level, very firm, and promises to afford substantial shelter. The windows, constructed of one

single plate, have been specially refrozen on a neighbouring lake for this purpose, fresh water affording more brilliant and transparent ice: they measure three feet by two, and are four inches in thickness. In this particular we beat the Crystal Palace, as we can have them of any size "to order," and without additional expense!

The sun should be asleep, but his rays continue to illumine a considerable arch of the horizon, and his countenance was so far refracted yesterday as to be seen from the maintop. About 40° to the westward of the meridian, or of his position, a luminous prismatic tinted mass of light appeared to represent one of his parhelia, the other was obscured by intervening land. The temperature ranges at present between +10° and −18°.

*November* 5.—Experiments were attempted last season on the rate of freezing of the sea, or positive increase of floe-ice: but as they were not satisfactory, and moreover so much at variance with any probable facts, I determined to repeat them this season under proper inspection, and to continue them up to the time of thaw in spring.

In order to secure the entire range, a smooth place on the floe was selected, and an open parallel gauge inserted, which would not be extricated until the end of the season. All measurements were to be made in radii near this centre. This gauge was formed by a square tube, open on two sides, and inserted five feet six inches beneath and eighteen inches above the floe, the thickness of the ice at the moment of insertion being eighteen inches.

The arrangements on board for maintaining a more

equable, dry, and satisfactory temperature have been completely arrested, until winter places our fate undeniably in our own hands; as until the ship is beyond doubt "frozen in" we are unable to secure the hatchways. As far as present experience affords a test, all our experiments have so far proved satisfactory, that we experience a much purer air below, less condensation of vapour, and more general comfort; but until the outer cold air can be entirely cut off, the plan is incomplete. At present no less than 12° difference of temperature is apparent between the external temperature and that on the quarter-deck, the former being −6°, and the latter +6°.

It is strange, however, that even with thermometer proof, some will obstinately cling to "former cruises" and impressions, even in questions where health and life are hazarded.

According to my notions of Arctic visitations, I anticipated the first notice of intense, or winter, cold between the 6th and 10th of November, or by last season between the 5th and 12th. Yesterday, the 6th, it fell as low as −12·5°, but rose again on the noon following to −6°.

The observations as to the lifting of the ship have been completely realized. A batten nailed to the stern-post indicates at present an elevation above the previous ice level of eighteen inches at the stern, or a depression at the bow nearly equal to two feet on her true line of floatation: and this difference of level has, I suspect, aided Sylvester's warming apparatus to work more to my annoyance, as well as that of the officers; not by warm air, but conveying to the after-cabins the nauseous perfumes of the boiled cabbage, tobacco-smoke, etc., from the

lower deck. I cannot imagine that any seaman would sail his ship two feet by the bows, on the chances of deriving benefit from his warm air apparatus.

Quitting this subject, and turning my thoughts seriously to this fact of uplifting, the natural question arises, For what purpose is this interference of Nature? Has it any connection with our safety? Will it tend to our destruction or preservation? Most undoubtedly, on scientific reasoning, it must conduce to the latter: each succeeding lift will aid in taking her keel out of the clayey bottom, and should another "run of the ice" recur, merely pass her higher up, leaving her keel unhurt. To those far distant the natural impression would induce the belief that for the winter we might consider ourselves free from further disturbance. But the Americans we know experienced drift of the main pack in Wellington Channel late in December, and beyond Lancaster Sound during the whole winter. We know full well that about the 9th of November we have to expect one of our strongest gales; and bearing in mind that "forearmed is forewarned," all our preparations must be continued to meet the worst.

Our Crystal Palace is far advanced, glazed, and merely awaits the roofing. A smaller house for magnetic and astronomical purposes has also been completed, and a very convenient copper stove and piping will render it comfortable. The entire buildings present from the ship rather a formidable appearance; the Palace, with its windows, resembling casemated embrasures, and the Observatory a flanking bastion.

Eventually, should it not be the will of Providence to

force us to seek its shelter, it will afford an admirable retreat for healthy exercise and amusement, possibly for the seamen's theatricals. The latter did not take so well as expected last season with the officers; indeed, most of them were of a more serious turn, and I cannot observe any chance of their resuscitation. For myself I did not enter into the spirit of or admire them much, and to make a man *malgré lui* render himself ridiculous by failure, is little less than a miserable attempt at buffoonery; such, too, I believe to be the prevailing opinion. Nevertheless, even to kill time, I shall use my best endeavours to promote them, should our "indefatigable proprietor" intimate any such disposition, particularly on the part of the seamen. The mere act of learning their parts frequently inculcates some moral which may prove the keystone to future development of abilities.

*November* 7.—This morning the officer of the watch, Mr. Pim, on his visit at two A.M. to the external thermometer under the stern, noticed, as he imagined, a strange and taller dog than any belonging to our establishment, and not liking his appearance, returned on board to assure himself of their presence. This satisfied him that the visitor was no less than a wolf: not at all a pleasant companion at that early hour, and unarmed. These matters seldom lose by telling, and the version first promulgated was, that Pim was about to pat him, when he discovered his mistake: but his own version I prefer:—"he did not approach nearer than ten yards; the weather was thick and sleety, and he did not feel the slightest inclination to fraternize." Was this our mysterious wolf from Arthur's Strait?

In addition to the rate of the freezing of the sea, we commenced the construction of another snow-bank, for further trials on the immersion of thermometers; a tube was also inserted four feet beneath the gravel, for a similar purpose; but as ice invariably presents itself at ten inches beneath the surface, this can only after all be deemed as inserted in ice. All these experiments are however dependent for their commencement on the rise of the thermometer to zero.

Our thermometric comparisons for this season have, owing to our insecurity and chances of destruction to the instruments, been confined to the floe, and, in order to avoid any influence from the ship, they have been fitted in a small boat, inverted and suspended from the driver-boom astern of the ship, their bulbs being five feet above the present upper level of the ice. In addition to this, at six feet from the ship's stern, very substantial snow-walls of eighteen inches' thickness are also interposed. This leaves them fully exposed from our prevailing winds, or from east round by the south to south-west.

*November* 9.—Today the temperature fell as low as −33°, and this being below that experienced about this date last season, tends to verify my theory as to our first visitation of winter occurring between the 1st and 10th of November. But, notwithstanding the barometer continues to fall gradually, we have not as yet any notice of our annual gale. The Crystal Palace being complete, and flag-staff erected; on this the natal day of His Royal Highness the Heir Apparent, the national colours were displayed, the crews assembled, the healths of our Gracious Queen, the Prince and Royal Family drunk, and

F.M.cDougal del.

Vincent Brooks Lith.

Crystal Palace Winter Quarters 1853-4.

the Palace duly christened "Albert House, of Victoria Town," with three times three hearty cheers. The Observatory also obtained the honour of "Cornwall Lodge." This concluded the ceremony, except that which was perhaps almost as acceptable to the spirited builders,—the repetition of the toast at their warm meal in Allsopp's universally applauded "best."

Out of good evil will oft arise: and thus it happened to some of our zealous and loyal party, who had incautiously ventured direct from their warm quarters to participate in this important ceremony, exchanging a temperature of 60° to −23°, = 83° of cold. This immediately touched fingers and noses, rendering them of that peculiar deadly white known as frost-bite. This affliction has long afforded the old Arctics the privilege of taking their friends by the nose, in order to restore animation. But it has now lapsed into the simple application of the back of the warm hand, as the more inoffensive and approved mode of conveying kind attention.

Our gale, although not felt by us under the protection of the land within us, evidently blows strong aloft, the temperature rising to −14°, and the scud aloft flying rapidly from the south-south-east. On the 11th of November it had increased considerably, but still aloft, raising the temperature to −6°; but the whistling of the breeze, added to the rattling of the frozen ropes about our mastheads and mizentopmast, afforded music sufficiently discordant to materially interfere with pleasant dreams. The dryness, as well as lightness, of the ship renders her almost as sonorous as a musical instrument; and the sounds resulting from pacing the deck, or even

the floe cracking near the ship's sides, are far from aiding our slumbers, which on this second winter we find somewhat impaired. In addition to this, the appetite is almost wanting, wine is not appreciated, and it would require infinite labour to afford even Monsieur Soyer definite instructions as to what would be palatable. Yet eat and drink we must, in order to sustain nature, and prevent our falling so far behind as to render recovery of strength even doubtful.

*November* 20.—I shall now recur to our fitting for winter, warming operations, etc. The system, in so far as our experience affords a drier condition of the lower deck, appears to answer completely, considering the restricted means at our command. But our experiments with imperfect fittings remind me much of a leaky ship, the air in the present instance forcing its way in by every unstopped crevice. However, such as our success has been, may easily be derived from the following. The nearest approach to our present temperature occurred about the 14th of December last season.

| | Dec. 14, 1852. | Nov. 9, 1853. | Difference. |
|---|---|---|---|
| Shore . . . . . | −36° | −33° | 3° |
| Deck . . . . . | −33 | −14 | 19 |
| Main hatchway . . | −33 | +28 | 61 |
| Bows (ld.) . . . | +48 | +49 | 1 |
| Mainmast . . . . | +42 | +50 | 8 |
| Gun-room . . . | +43 | +56 | 13 |
| Cabin . . . . . | +42 | +53 | 11 |

By the above it is apparent that we obtain 19° on

deck, and moreover free from any breeze or draught; 61° at the condenser over the main hatchway, and about 40° above the old snow-house for washing: to expatiate on such advantages would be idle. But what amount of perfection one would be warranted in anticipating under adequate fittings for Arctic service would probably still more astonish those who have hitherto been incredulous. The great point to which my present interest is directed will not undergo a fair trial until the spring, when with glazed windows adapted to our housing, I fully anticipate great advantage to the invalids, invariably invigorated under scorbutic affection by the sight of light and the sun's rays: in fact, in a deck hospital, under a temperature not much lower than that of our lower deck during the last season. Last evening, notwithstanding such imperfect fittings, we had an opportunity of testing the result of a strong gale, 5 to 8 from south by east, attended with considerable drift. Although the drift penetrated, abundantly showing every imperfection of our workmen, we contrived to preserve —8° on the quarter-deck, when the external air ranged —17 . During this breeze I momentarily expected some movement of the ice; but beyond heavy cracks and jarring of the outer ice, no perceptible disturbance could betraced.

We have now pretty well settled the true cause which produced the sensation to those ice-bound, and termed hitherto the snapping of bolts, etc. I have watched it narrowly, and for every crack so heard read "a crack in the floe, which instantly communicates itself to our musical box." I have traced them all satisfactorily, and I further notice, that as the ice increases in thickness, that

the sound is not so sensibly communicated. If the noise had resulted from bolts breaking, where, I would ask, would the 'Assistance' be now? But who ever discovered a bolt broken? And so convinced am I now that these noises will cease as the cold becomes more intense, that I intend to direct "every crack heard to be registered." If they should cease, even when we know the ice to be cracking extensively, the ship being isolated in her own piece of floe, surely no one will contend against what we experience and register! or let some better informed person instruct us why the 'Assistance' ceases to crack; or are all her bolts and trenails destroyed?

To meet the ideas of those who contended for ventilation, I tried an experiment on our main hatchway condenser, fitting two ventilators with the elbows of the cabin stove-pipes, of copper. The result was speedily determined: the temperature fell to 9°, instead of 24°. The lower-deck sleepers protested against the cold; moisture ensued: they were abolished, and all went right. Did I convince any one?

*November* 25.—Upon examination of the ice-gauge for the last twenty days, it affords a mean of 0·5 inches, or half an inch per diem increase, the mean temperature being −25·756°. This appears to approach to something like reason; for we find, with a temperature of −26°, that the ice at the surface of the sea will freeze more than four inches during twenty-four hours. This must also be much influenced by the depth, currents, nature of the bottom, whether rock, sand, or mud, as well as by any gaseous formation beneath, affecting the general temperature of the underlying sea.

As a table will be formed, exhibiting the progressive increments of ice during the season, it will be needless to state here what will then, I trust, be satisfactorily demonstrated by experiment, as well as the whole mode of proceeding.

The average temperature of this season seems to indicate a more severe winter than last: thus, last year we experienced, between the 20th and 27th of November, 1852, 'Assistance,' max. +17°; min. −12·5°; mean, +0·380°; between the 20th and 27th of November, 1853, max. −14°; min. −37·0°; mean, −27·714°. The mean for the month, unless we have higher temperatures, must be low; that of the 'Hecla,' at Melville Island, in 1819, being −20·6°.

*November* 30.—Having completed the month, we will compare the results:—

| | Max. | Min. | Mean. |
|---|---|---|---|
| 'Assistance,' month of November, 1853, | +7°, | −37°, | −18·330° |
| 'Hecla,' „ „ 1819, | +6°, | −47°, | −20·600° |

Carefully turning these matters over in my mind, it occurred to me that in the higher latitudes it would probably be found that a mean minimum temperature would prevail, notwithstanding sudden and unaccountable extremes, below anything experienced by our predecessors. I therefore referred to the records of the following vessels, as likely to afford me some insight into this presumed law. I found them to coincide most wonderfully, omitting for the present our own tables for 1853 until the completion of the seven or nine months.

| | |
|---|---|
| 'Hecla,' Melville Island, mean of nine months, October to June . . . . . | −09·07° |

| | |
|---|---|
| 'Enterprise,' Leopold Island . . . . . | −10.44° |
| 'Resolute,' Griffith Island . . . . . | − 9·57° |
| 'Assistance,' Northumberland Sound, 1852–3 | −10·03° |

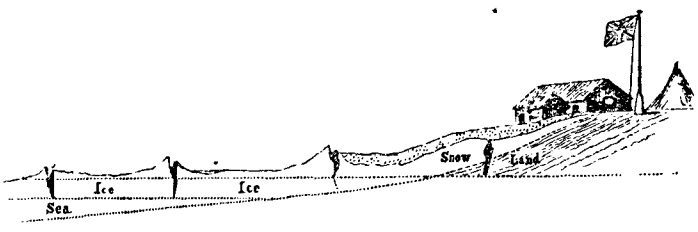
It certainly appears very strange that the results should so nearly agree, but it reminds me strongly of the general guesses which have been made since we reached these regions, not only in our times of starting, but in our general estimates of the operations to be executed, and the written orders issued in consequence.

It is true that the records of Parry's voyages, and some chance private manuscript extracts from those of Sir James Ross and Austin, happen to be in my possession, from which various questions have suggested themselves, and so far experience may be said to have lent its aid; but it may naturally occur to my readers, Why cannot all officers commanding such voyages adopt the law of the profession? Why is Parry's the sole official authority? We have no published information from Sir James Ross, Austin, or Saunders, to aid us either in temperatures, tracks, *homeward* or outward! no seamanlike observations to guide us in the selection of a homeward route. The profession may exclaim, You must exercise your own ability. That I am prepared for, in so far as experience has been gained; but when called on to write instructions, and to direct a vessel to pursue a certain course, for her safe as well as rapid voyage to England, I should be prepared with some reason to give for the selection of a route which may differ from the only record supplied by Parry in his voyages of 1819 and 1824.

Here I am sent to discover quite as much as Parry was on his first voyage, and, in many instances, find

the aspect of affairs in 1853–54 to differ materially from that recorded in 1819 to 1824; and yet five Expeditions have since visited Lancaster Sound, without having recorded their opinions or furnished tables of temperature, or remarks upon the ice navigation of Baffin's Bay! Fortunately, some previous acquaintance with the peculiarity of cold climates, and a close study of certain theories connected therewith, have enabled me to form, as they have eventuated, just conclusions, but nothing to warrant deviation from the beaten track,—nothing but presumption,—should failure have occurred. Too true the adage, "Success is wisdom;" but, had misfortune resulted, no one but myself can feel how many disappointed opinions would have been hurled at my arrogance! It is a very slippery climate and a very slippery service. Prosperous as we have hitherto been, I still shall rejoice with no common joy at my completion without disaster.

Today I examined the tidal fissures on the coast-line; it was nearly high water, and the cracks did not afford




so perfect an exhibition; nevertheless the upper gaps were wide, and convinced me that the general motion of the ice must be insensibly, as we have no gauge to determine its action, drawing off-shore. In some in-

stances the in-shore pressure was visible by the arching or buckling of the ice, which I have endeavoured to exhibit in one of the Plates, as well as at page 149, Vol. I. The curvature, in a span of eighteen feet of the in-shore ice, was three feet; in twelve outside, two; but nine cracks altogether between the ship and the beach.

The angular edges of the gravel terraces, numbering twelve from the beach-line to our nearest rise or first plateau, were completely denuded of snow, and exhibited the formation due to about one hundred feet vertical elevation very prettily.

Our Allsopp's ale being expended, we commenced our ship brewery last week, as well as the cultivation of mustard and cress, the results of which will be found tabulated in the Appendix.

*December* 5.—Our experiments on the freezing of the floe seem to preserve a very regular progress, not exceeding half an inch per diem; indeed, considering that the floe has now attained a thickness of three feet, I cannot imagine that any further decrease of temperature above the floe-surface will materially affect this apparent fixed scale. The increase at present must depend on the temperature of the sea beneath, which during winter we have found to maintain nearly the freezing temperature. Last year I noticed that water taken at six fathoms below the surface, and suddenly brought into my cabin in the bottle by which it was procured, exhibited a floating white surface of two inches, which, on close examination, was found to be composed of fine detached stellar crystals. I further noticed that the main body of the fluid was also fully charged with these crystals, and

that until the temperature rose they maintained a constant motion towards the surface. No ice formed; it was like brilliant snow, and not cohering. It immediately occurred to me that such a process, constantly in action beneath the floe, may possibly, by cohesion, afford the small daily increment which we have just noticed.

At noon today the light was as clear and bright as a December morning in England; the stars were still brightly visible to the northward, but the southern arch of light, only illumined to about twenty degrees of altitude, and tinted pale rose and yellow, rendered even those of the first magnitude very indistinct. We have not now for some time experienced any decided motion of the ice, and begin to feel that we have a chance of resting quietly in our ships for the remainder of the winter.

The cold has undoubtedly penetrated the ships laterally, and to such a degree that some of Allsopp's ale, stowed at the end of Sylvester's apparatus, and which does not freeze until the temperature falls to 22·5°, was found congealed in the neck of the bottle. I have therefore had an ice wall built round the after-part of the ship, and filled in with loose snow. To those who may take bottled fluids to such climates it may be useful to know that, if champagne bottles be used, the ice forms in the neck, expels the cork, and performs its duty.

The deck temperatures now average from nineteen to twenty degrees warmer than the external air, excepting when we have a strong wind, when the bare hangings, of loose sails, will not of course impede the passage of snow-drift; but this does not at all affect our internal tempe-

rature, which ranges between 40° and 50°, and 35° to 45° in my cabin, where Sylvester does not aid.

The loading the decks with gravel and snow has of course been superseded by the dry wood deck, the temperature of which cannot well be proved. A very great advantage is thus secured, as the removal of the snow and gravel (literally ice) damages our decks and glass-illuminators considerably. Last season the cabin skylight was filled in with oakum, and became almost a mass of ice. It is at this moment free even from internal frost on the glass! The clock occupies its summer position, and is read off from my upper condensing house by the sentry on duty on deck.

*December* 8.—I was agreeably surprised to find a very refreshing salad of mustard and cress placed on my table, and further, that an issue of seven pounds had been administered among the crew generally. This exceeds our gardening of last season, when I perceive that our first issue of three pounds took place on the 1st of January. Certainly that before me was rather deficient in its natural colour; but our eyes are now so very weak and jaundiced, that I must imagine they deceive me; in flavour however it was perceptibly grateful. We have also commenced brewing spruce beer, for the use of the invalids. The first porter brewery has proved more successful, so that we are evidently becoming more *au fait* at these matters. As regards the condition of the crew generally, they appear to increase in size, probably the result of additional clothing; they are nevertheless fuller in countenance, and the brightness of the eye assures me that their general health and cheerfulness are not im-

paired. On the 1st and 14th of each month they undergo a close inspection by the surgeon, but specially as to any indication of scorbutic affection. I regret however that two of our invalids furnish very anxious cases. One, attached to the 'Pioneer,' exhibited symptoms of scurvy in June last; the other, in this ship, commenced with disease in the bones of the right foot, evidently scrofulous. These have remained much the same for the last six months; but within the last few days it is very apparent that they are much reduced by inaction and confinement to their cots.

We have been particularly exempt of late from even moderate breezes, but the lofty fleecy clouds seem to travel with some rapidity from the southward. This evening I went out to look at the moon passing our meridian, north. I found it encircled with a peculiar dancing image, which I at first ascribed to defective vision. Shifting my view to the stars, I found my sight to be perfect. Determined not to be put out of countenance by the lady, I again faced her. I now discovered a very beautiful play of radial coruscations, expanding and contracting like the pupil of the eye under sudden changes of light. One cause probably might be referred to the increased or diminished light on my own optics; but the other I detected to proceed from very light fleecy vapours passing over the surface of the planet, and, according to the number of laminæ or their density, producing this flickering radiating appearance. Although calm below, the breeze aloft urged these mists with great rapidity.

At a later hour a very clear exhibition of paraselena

occurred, nothing however to compare with the splendour of that noticed last season; but two well-defined luminous spots were observed horizontally, and a trace of one vertical to the planet. To the southward the horizon reminded me of the reflected gas illumination so well known to pervade the atmosphere above London; at times I fancied I could almost distinguish some brilliant lamp. Last year Venus exhibited herself something in this manner above the pack, and presented a most beautiful pharos, but at present she has at least forty-five degrees of azimuth to the eastward. It may yet have been a reflected star, or one of imagination, and rather forcibly brought to my mind, "What would I not give to wander?" However, duty keeps us here, and a cold one too!

On the 17th the weather proved beautifully clear; shortly after noon I strolled towards the Crystal Palace, which has lately been devoted to the use of the skittle-players. At these springs the tide rose higher than usual, and my attention was attracted by the repeated noise resulting from the cracking of ice, as well as snow. It occurred to me that part of the noise resulted from my walking over the floating ice. I stopped five minutes and listened attentively, when the nearer cracking noise apparently subsided. As I again proceeded it increased decidedly; and on entering the snow its peculiar rushing noise, as of the escape of air, became very apparent. In the summer this latter sensation is at times startling, and, I believe, results from the air generated beneath by the sun's rays forming an ice-crust, thus causing a rushing sound in the ears as it escapes at the fracture made by

the foot. In the case before me I can only imagine the surface snow to be supporting in the arc the warmer air resulting from the radiating tendency beneath, which any vibration would assist in breaking at the arc. On board I have frequently watched footsteps from the 'Pioneer' to the ship, and detected the sharp crack of the ice as the party reached the gangway; or, in olden phrase, "a bolt cracked." At each operation of breaking the ice at the fire-hole a similar noise is detected, and in my bed-place is particularly perceptible.

On the 18th I inspected the 'Pioneer' hospital, but found her close, and not, to my senses, so completely ventilated as the 'Assistance;' odours from rope, tobacco, etc., reminding one very much of the first night after leaving a dockyard. On my return the clerk, by the light on the floe, was able to read small print, but "love" was the word he hit on.

*December* 22.—Our mid-winter is past, or the supposed winter of England commences; why so termed I cannot conceive, as from the 1st of November until the 10th of March, or later, the actual cold continues: the 15th of January is nearer the true period; however, to us the shortest day, and, even with a diminished moon, it is perceptibly lighter. This may arise from the sun's rays to the southward being less obstructed by clouds; for the illuminated vault must, in some measure, be affected, either by the absence or presence of vapour or atmosphere at a sufficient elevation to reflect the light. One decided proof of an intervening medium is the diminished brilliancy of the stars.

*December* 24.—Mighty preparations for the morrow;

no riveting up of armour for the battle, rather the destruction of iron cases labelled 'Hogarth,' 'Fortnum and Mason,' 'Masson,' etc., which have confined within their iron bounds the customary issues of extras for Christmas cheer, not forgetting some of the despised *lummes* brought up by the sledges from 'North Star.' The bill of fare for this season may not prove as luxurious as the last; nevertheless even lummes are acceptable: a flock of sheep would have been more to our purpose. It brings very forcibly to my mind poor Sir John Franklin and the stories about such birds, of one-tenth the weight of lummes, salted down by him, possibly for some similar purpose,—a gratuitous addition to some festive meal! May God's blessing attend their enjoyments! No man can be happy unless happiness is reflected from the enjoyments of those around him, and I see with very different eyes what I beheld at the last anniversary. Then, each was actuated by the novelty of the first Christmas in the Polar regions; now, many feel the disappointment at being hemmed in here, without further prospect in spring than double and very severe duty, with very diminished appetites. Let not closet schemers discuss the question of supplies; we have abundance; but two seasons sadly cut down the appetite, and it would fare hard with many fine men here if they were compelled, without sufficient excitement, to undergo another season north of Beechey Island. Volunteers as we are, or the fact of being caught like the 'Investigator,' would enable us to go through our imprisonment better than our neighbours, for we are amply provided; but at the very threshold of the English post-office married men will pine, and think even com-

fort a severe hardship. This is merely my private opinion, not discussed; for we had not the most distant idea of going home last season; indeed, although I should have left the 'North Star' at Beechey Island, I had already determined, if I passed that position, to have wintered in Pond's Bay, the Clyde, and other positions, where I am now convinced that search for traces of Sir John should be made, convinced as I am that he never passed up this Channel.

*December* 25.—Here then we have reached Christmas Day,—not unlike any other, but Sunday adds to its solemnity, and brings our day of rest from bodily, but not mental labour. This morning the ice was gauged, and found to be three feet eight inches, = 44 inches, or at the rate of 0·45 during the last ten days, the previous ten being 0·35; which will hereafter be reduced to a tabular form, as well as the effects of fittings, which afford 19° increased temperature on the quarter-deck, without wind, and in the main condenser over the main hatchway (open) 46°, the external air being only −19°.

I first visited the 'Pioneer,' and although that is now our hospital, and some allowance must be made for two invalids in a very doubtful state, still there appeared to be some attention to the comforts of the season. One of the invalids indeed appeared to be in higher spirits, and took a fancy to a glass of champagne, in which, of course, he was, with the doctor's permission, indulged.

At noon I examined the good cheer and admirable taste and comfort displayed on board the 'Assistance;' and as I saw enough to describe, I shall not omit giving

an outline, commencing with the Marines' mess, on the port or left side aft, of which our Sergeant, George Jeffries (formerly one of the heroes of the 41st at the Cabul Pass, etc., in 1842, and a most exemplary soldier here) presided.

No. 1.—*Motto:* "ROYAL AND LOYAL."

A very neat chandelier, tastefully got up with coloured paper, tinfoil, etc., having the National flags on the circumference, supporting the colours of the Royal Marines.

No. 2.—*Motto:* "THE OLD HOUSE AT HOME."

A very gaily fitted chandelier, bearing the National Colours, above which was an excellent representation of the misletoe, the whole surmounted by a large crown, formed with coloured papers. Two tablets with English ensigns worked and painted on them.—(Briant, Artist.)

No. 3.—*Motto:* "THE WEDDED MANSION."

A portrait of the wife of W. R. Huggett, A.R., and a neat chandelier. The dinner appeared tempting, and everything emblematic of home: but I looked in vain for the wives who had so tastefully laid it out. I at once thought of the domestic sailors.

No. 4.—The Bows (artificers' workshop). *Mottoes:* "WISH YOU A VERY MERRY CHRISTMAS," "THE WELCOME HALF-WAY."

This space was enclosed with a new white St. George's Ensign, hiding the sides, etc., and forming a very chaste alcove. In the centre a throne, and above a small regal crown, awaiting only Her Majesty's presence. It was expected, I imagine, that I would be seated there: but it was a bad bait, although one's loyalty can hardly be doubted here. Two large crowns on either side, Plates of the Queen, Prince Albert, and the Royal children, supported by the Crystal Palace, and Jenny Lind, occupied the back ground, the whole lighted by a very tasteful chandelier, bearing the National flags. Entering on the left the passage was labelled "Albert Street," that leading out "Queen Street."

No. 5.—*Motto:* "THE JOLLY BACHELORS."

Starboard side, "Bachelors' Hall" (opposite to last), "God Save the Queen," "Dieu et mon droit." A chandelier tastefully fitted and surmounted by the war medal of J. Galavan, Captain Forecastle; seve-

ral good plates, one of roast beef, too good to be true; some carvings of the Arctic ships under sail.

No. 6.—*Motto:* "THIS POOR MESS IS LOST FOR WANT OF TOOLS." A neat chandelier, and a good sketch of a good English Christmas dinner.

The following decorations were noted on board the 'Pioneer':—

No. 1.—A neat chandelier, with the national flags.

No. 2.—A neat chandelier.

No. 3.—A neat chandelier, national flags, and a print of Britannia.

No. 4.—A gay chandelier, surmounted by a figure of Her Majesty; several scenes taken from the 'Illustrated London News.'

The Christmas cheer was disposed with great effect, and although at the time I was rather an invalid, still I felt some inclination to sit down and gratify them by participating. At the moment I felt suddenly weak, and had barely time to accept from the wedded mansion the cake and wine presented.

One wish I did secretly breathe,—that these fine fellows may find their next Christmas cheered by those of whom they now evidently thought so much. But to my toast:—"Our Gracious Queen, Victoria, God bless her!" "Prince Albert, and all the Royal Family!" "Our absent Squadron companions, who will not forget us; may they be as safe, happy, and comfortable as yourselves, and God bless them!" And now, "May you enjoy as happy a Christmas as I wish you! May you be as well, even better, should it be our fate to be detained here another year,—and may God bless you all!" I then left them to their revels, and never do I recollect a more orderly conducted Christmas.

*December* 29.—The week has passed quietly, but

cheerfully, singing during the evenings appearing to be the prevailing humour among the messes. Last night heavy sounds were distinguished in the direction of the outer ice, consequent on splitting, by tidal or other causes. The pack outside of us is also much cut up by the unequal pressure of the masses, exhibiting some very awkward cracks for travellers. At noon the light was sufficiently bright to read small print, the atmosphere also very clear.

The principal exercise and amusement now,—for it is very hard to make men amuse themselves, or to find matter on which to work,—is skittles, which is played in the Crystal Palace. A wolf has paid frequent visits, and at times appeared inclined to fight our dogs; but Lady Fanny, ever on the alert, is sure to arrive in time to rescue poor Punch, who, though game enough, is very uneasy on his pins, and has but few serviceable teeth remaining.

*December* 31.—They are now singing the year 1853 out; but, from all I can collect, the greater number are inclined to do the thing more sensibly by sleeping the New Year in.

Fortunately a change of temperature enables us to place our thermometers in the snow bank, but the period was but short, falling during the operation to $-10°$: the result will appear hereafter in a separate Plate, when they are read off. On this occasion they were in a more sheltered position, filling up the angle formed by the western and northern sides of the Crystal Palace and the Observatory. As the numbers will indicate, they were placed respectively that distance in feet below the

surface and from the exposed sides of the block: that placed in the ground tube occupied a position between the block and the Observatory. Our anticipations of decrease of temperature were in this instance groundless, as with the increase of wind it rose rapidly to +25°. Aloft it evidently blew a heavy gale, of which we were merely entertained with the whistling and rattling of our loose gear aloft. On the floe, however, a very considerable accumulation of snow-drift was deposited, much in the same manner as last season, and although not so high, afforded a comfortable promenade around the ship.

The recurrence of this forcibly brings to my mind the reports of houses, tents, etc., overwhelmed by the snow-drift of a night. There can be little doubt that under circumstances favourable to deposit, as flocculent snow, low temperature, and no reverberatory action by state of the wind, this could easily happen. But our observations here teach us that the drift snow of an Arctic winter is of an entirely different disposition. I have before remarked, that it is not properly snow, but very fine drift ice, which is transferred by the slightest action of the wind. This is particularly apparent on every abrupt angle of the terraces, or smooth rounded summits, of the coast-line. Last winter it did not surround the Observatory, nor the boat under which the standard thermometers were placed, nor the washhouse,—on one side it rested, but not to press on or incommode. Indeed it so happened, although on opposite sides, and within a few yards, that the reverberatory breeze deeply scored, or furrowed out, spaces where absolutely convenient; forming indeed a protecting guard, with a space between it

and our objects of some five or six feet. This any rational mind will comprehend as the effect of an eddy wind, and the elevation and firmness of such a deposition, reaching to that exhibited in the former volume, depends entirely on the force and continuance of the breeze, as well as the surface of the body deflecting it, until it becomes of no further importance by the greater elevation of the snow-wreath to windward. If this overtopping wave of snow-wreath should reach the object, doubtless the bank would form a solid bridge. Even at this season we have several very pretty illustrations; first in the Crystal Palace, next in the tents pitched beside it, and thirdly in the cask inverted over our ice gauge on the floe. In the Crystal Palace case the breeze has furrowed out a fair passage to the principal entrance on the south, and behind, where the provisions have been stowed,—enabling us to dig them out as required.

The tents, particularly the circular bell tent, from constant vibration, throw off any snow which falls, and the breeze prevents its resting within a deep circular ditch, having full three feet depth of snow surrounding it; and the inverted cask on the floe equally bids defiance, preserving its base free by a similar furrow. If the ship was not so well sheltered by high land from the prevailing winds, doubtless she would exhibit another interesting snow-wreath.

## CHAPTER IV.

Increase of Temperature.—New Year's Day.—Cold Periods.—Death of George Harris.—Remarks on Scurvy.—Prismatic Cross.—Dead Men's Effects and Wills.—Cracks in Grounded Ice.—Rise of Water.—Death of Isaac Burnett.—Extreme continuous Cold.—Racing.—Condensers.—Similar Temperatures.—Re-appearance of the Sun.—Preparations for Travelling.—Instructions to Richards and Kellett.

*January* 1, 1854.—THE aspect of the snow around us this morning forced on my imagination, perhaps fanciful, the idea of a watchful mother spreading her graceful arms around some cherished object, and protecting it from injury; the greater elevation of the snow astern representing the breast, and the gradual tapering to the bow the arms, probably the nucleus of a more elevated defence against the breezes of February and March.

The increase of temperature, at present $+26°$, so far from proving acceptable, is viewed as a perfect nuisance, causing wet decks and a very sloppy floe. But let us not hastily complain: that very softness and high temperature will undoubtedly act to our future comfort and advantage by filling up with snow, consolidating and smoothing, the present inequalities of the pack, which, in its present crude and angular chaotic condition, would

render spring travel almost impossible. We hardly look beyond our present sensations; but having experienced a temperature of −46·5° but three days since, it is not probable that we shall be long in this fancied misery.

On this, our New Year's Day, I have inspected our home department between decks, where I was pleased to notice the same comfort, good humour, and good cheer reigns. I had but little to add to my Christmas toasts, but the wish, which many emblems exhibited forcibly brought to my mind, that they had the fairer part of the creation to warm their hearts and render enjoyment more rational. After the customary toasts of Her Majesty, the Prince, etc., I had only to express my wish that the opposition between the adverse berths, married and bachelors, might be swamped by the single becoming married and the married happy, sentiments which seemed to find an echo even in these dreary regions. The preparations for enjoyment were apparently on an increased scale: comfort and cleanliness, those virtues inherent in all well ordered and well disposed seamen, prevailed; and happiness, if that commodity ever reaches thus far north, I have reason to hope was in a small degree disseminated. What robe she adopts here it is difficult to determine: if white, how happy and innocent we should be! the *couleur de rose* is not traceable.

*January* 5.—The result of much noise and anxiety proved that Punch had again got into bad company with the wolf; but his faithful ally, Lady Fanny Disco, in the most affectionate manner, rushed to his rescue, and brought him home to his family. Daylight, or the grey tint of an English morning, is now fast extending, and

about the 12th of February we shall be keenly watching for "the prodigal's return."

*January* 8.—About this period last year we experienced our extreme range of cold, but this season it seems to observe nearly a week or a quarter of a moon later, which would accord pretty well with the difference in the times of full moon,—indeed, almost a complete substitution of the full for new, less four days. Under our present temperature of —42° I never witnessed our lower deck in a more dry or comfortable condition. Our system has at length not only become completely established, but even the most sceptical are now almost as determined in their commendations.

*January* 9.—Yesterday I noticed a wolf prowling alongshore when I left the Crystal Palace: had he been inclined, he might easily have cut me off, as no one was in sight to alarm, and I was too weak to make any run. Today, hearing his howl in the direction of where our men were at work obtaining clean snow to melt, I sent a man with a musket for their protection. I found afterwards that there was but one man, J. Billett. He described the wolf as close to him, and "that he was howling in concert to keep him off." The wolf did not tarry for the arrival of the man with the musket: they are much too cunning to be taken.

*January* 10.—Shortly after midnight, at 0.20, George Harriss, one of the invalids on board the 'Pioneer' tender, departed this life. I fully expected his decease within the week, having made his will the day before, and evidently felt that he was going. He was taken ill about the 25th of April last, complaining of cough, pain in the

chest, and weakness. He was absent on sledge duty with the South-west Division, but returned on the 3rd of May, complaining of pains, and weakness of limbs. It appears that he was discharged in six days from the list; but after my return on the 26th of June, he was reported as affected with scurvy; and having examined him then with the Assistant Surgeon of the 'Pioneer,' his body and limbs were covered with small spots like boils, but with dark ringed bases,—in fact, such an eruption as is often noticed in pauper patients in England.

Having witnessed a great deal of the worst kinds of scurvy, as well as that resulting from no known cause, on the coast of Africa, I did not think the spots alone warranted scurvy. However, at that period he gave way, being of a very slothful habit, difficult to keep clean, and, as I clearly foresaw, would hasten his own end by the want of common energy so inherent in seamen generally when they, as we term it, "take sick."

The attention of the Assistant Surgeon, Mr. Ricards, was unremitting: he personally attended, washing and sponging him; but no feeling of gratitude seemed to occupy the mind of the patient. Indeed, I cannot sufficiently admire the untiring zeal of the medical man with such an ungenerous, stubborn patient. I visited and endeavoured at times to draw him into conversation, but it was painful. If I had been, from some remote suspicion in his mind, the direct cause of his illness, he could not have displayed more moroseness; indeed, from the first moment I saw him in June last, he seemed to have "made up his mind to die."

This probably is one of the peculiar tendencies or af-

fections of this disease. I have heard of people begging to be buried up to the neck and left to die, rather than be moved. He never rallied, was helpless since August last, and, gradually losing the powers of speech and breathing, died without pain.

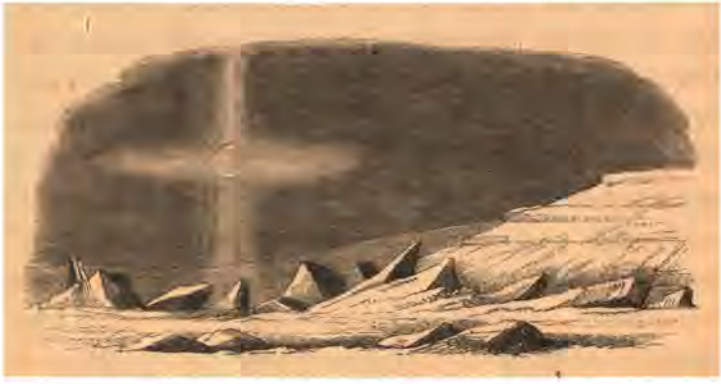
This case brings me to remark, although not applicable to the deceased, the danger of bringing seamen the second cruise to this climate—"because they have been here before."

I entertain the opinion that this is wrong, both in officers as well as men, *Captains* excluded. *They* know the defects of "last cruise," and can see that they are remedied; but in no single instance (and I have not been idle) have I been able to detect any advantage resulting from the entry of "old hands," indeed the reverse. All are given to talk: thus, "Oh! Tom D—— fell ill just in this way,—no scurvy, not a bit of it; he had a bad arm, it got worse, he died; and then they found it was all scurvy." These men are the first "hipped," and for sledge-work are next to useless. Last season I consider them to have broken down, and through the toils of this their pluck may carry them, but home they must go by the next opportunity, and what is the result? The feelings become unduly sensitive, irritable, and embittered; and they talk what I must, in compassion for their infirmities, term nonsense. Still however nonsense is contagious; it depresses those around them and creates dissension. These seers are prophets of bad omen.

*January* 12.—The wolf has become very audacious, having bitten the small bitch belonging to the 'Pioneer.' A trap has been constructed and very alluring baits laid;

but hitherto without success. He might have been shot from the ship, as well as from the 'Pioneer;' but some tales of the Boatswain and some of the men or dogs being mistaken for the wolf, determined me on forbidding any attempts to shoot him near the ship.

Today, on my stroll towards the Crystal Palace, I noticed a most beautiful phenomenon (noticed in 'Pioneer's' log-book); indeed, I much doubt if in the days of Columbus the whole crew would not have been turned out to pay the customary adoration. I was startled, and remained



stationary for some time, watching the apparent vision. It was the customary cross formed on the moon, but in this instance, being at a low altitude, north-east, a broad pyramidical base tapered from the floe to meet the vertical ray, and thus a perfect prismatic cross, with its pedestal, was most completely represented as rising from the floe. This occurred at two days before the full moon.

On that emblem, whatever his creed may be, no one can gaze without feelings, varying according to his education, moral as well as religious!

My course led me on to the grave which our seamen were digging, near the Observatory. At this season this proved a very difficult operation, the ground being frozen at one foot below the surface gravel, or, more properly, comminuted limestone; for gravel, properly so called, does not exist in this neighbourhood. Such work we found tried our tools severely, and from the low temperature rendering the metal brittle, they flew like glass. With loose stone and ice it is easier than with clay, which is absolutely attended with danger, splintering like glass.

Seamen are generally disposed to follow out the last duties to their deceased messmates to the extreme of their available means, and, as in the case of our Marine deposited on Mount Beaufort, the coffin was covered with fine blue cloth. As I was unable at the moment to attend to the funeral service, and necessity did not call for the immediate exposure of all hands to the present biting temperature, I found it more convenient to deposit the coffin on the covered-in forecastle of the 'Pioneer' until a warmer opportunity favoured. But when will seamen cease to be superstitious, or when will educated men cease to foster such prejudices?

Quitting this question, another arises, on the will of a person dying at sea. In the Admiralty Instructions nothing satisfactory on this subject is to be found, but the chattels and effect of every person dying at sea are "to be sold at the mast." This brings to my recollection a very interesting case which occurred in the year 1823, on board H.M.S. Salisbury, at Bermuda. A mate, named Wharton, was drowned; he having a presentiment that his death would be sudden, and, as it happened, ob-

tained a promise from a messmate, that, if he died or was drowned, he would destroy certain sealed documents in his desk. The case was referred to the Captain: he referred the matter to three Lieutenants to report upon. The two seniors decided to burn; the junior was of opinion "that it was illegal; it might be a will or family deeds, and, being dead, not his certainly; having died without a legal will, they were in the hands of the legal heirs." They were parchments, and they were, with some difficulty, burned! Let legal men declare, if the actors, who (excepting the party protesting) are now dead, were not wrong, at least before determining, by the preamble, of what character they were. I had a strong suspicion, from the character of Wharton, that they were of great importance to another party, and I urged the matter strongly against the act before the deeds were destroyed: but I was too young to have influence! The law on these matters should be fully set forth, for the information of all officers in command.

The 'Pioneer' having been fitted, in pursuance of orders, in a similar manner to the 'Assistance,' I was gratified to find that the same difference of nineteen to twenty degrees was found to prevail between the external and internal air on deck, as has been experienced here.

*January* 19.—Although the temperature has fallen to —52°, the cold has not been more sensibly felt than if it had been at 32°, owing to the absence of wind to press it to the body. The light has now become very bright, attended with bright auroral tints near the horizon, and fringing the hills due south.

Seven distinct cracks near the coast-line mark the lines where the ice rests upon the bottom, some gaping so wide that it requires caution to step over them. In several places, where rocks doubtless occur beneath, the floe is broken into very obtuse pyramidal irregularities.

*January* 22.—Under the low temperatures which we have lately experienced, —54·5°, the condensation at the bows, and about the mainmast, seems to call for further experiment. I have therefore opened two illuminators forward, and inverted casks over the orifices, securely fitted with oakum, etc., and further opened up the officers' companion, abaft the mainmast, three feet above the deck, covering it well with canvas. These seem to have acted very decidedly, by accumulating vast depositions of ice; indeed it is very clear to my mind that materials only are wanting to remedy instantly any defects of this nature as readily as they may present themselves.

It is my firm conviction that we are far behind in all the arrangements, and an entire new scheme should be adopted in the fitting of Arctic ships. All cabins should be free from the sides, and occupy the midship lines, with a free course for warm air round the wings from stem to stern. The messes should be placed amidships, and closets along the whole sides, for preserved meats, etc. This would not only enormously increase the stowage, but render the distribution of small stores much more convenient, and destroy all nests for ice, excepting such as would act beneficially, serving as condensers, from whence, having no shelves, the ice could conveniently be removed when expedient. However, as it is

my firm conviction that no further movement in this direction will again be attempted by Great Britain, it is needless for me to dwell further on the means I would propose.

During my examination of the in-shore fissures today my attention was excited by noticing some of the fissure edges raised much above their natural level, indeed beyond the limit where the tidal force should be exerted. The question naturally occurred, Does the ice in winter attract the sea, or does it afford any similar action to the capillary or sponge, to enable it to lift the inner or depress the outer portion? for clearly the water now acts beyond the tidal range of summer. Travellers indeed see strange things, but in no part of the world more unexplained and interesting matters than are daily presented in these inhospitable regions. Elsewhere the mind is perhaps more completely engrossed by subjects of greater interest; here every incident furnishes matter for deep study.

In order to satisfy myself upon this subject I revisited the spot at low water; the chinks or fissures varied from three to four feet in depth, and occur above the line of forced-up ice. Their sides presented, even at such an elevation, eighteen inches of visible clear ice, and on their sides the various gradations of efflux, in crystallized shelves, clearly indicated the action of the receding tide. The only mode by which we can account for this action, or flow above the natural level of a summer tide, is by supposing that the quantity of ice inshore will not rise or yield, and that the infused fluid, unable to find vent, flows up by every available fissure.

If this reason is tenable, it should also find its way up off-shore at the fire-hole cut alongside the ship.

*January* 28.—This afternoon, at 2.20, Isaac Burnett, Captain of the Maintop, died at the hospital on board the 'Pioneer.' In April last he complained of weakness and pain in the ankle, and was consequently withdrawn from the travelling party. As this progressed a disposition to scrofula succeeded, accompanied by disease of the bones. Latterly he had exhibited a more healthy condition, and I had strong hopes that he might reach England in time to save life; but since the death of Harriss he evidently became more depressed, and exhibited that peculiar quickness of feeling, and irritability, the peculiar attendant on scorbutic affection, which probably prevented his recovery. Eventually, effusion on the chest became apparent, and in the act of making some trifling exertion he expired, quietly and suddenly, as the Assistant Surgeon sat beside him; so rapidly indeed, that he was dead before the Surgeon, who had just quitted, could be recalled.

This case resulted in scurvy, owing to confinement and inactivity in a confined sulphurous atmosphere for a very long period. After his decease I discovered that Harriss and himself had been shipmates and second-captains of the foretop in H.M.S. Ganges; and from my observations on other persons, who were found to be partially affected with scurvy, I am satisfied that the mind will predispose otherwise healthy subjects to this insidious disease.

*January* 29.—The weather has latterly continued fine, and the natural result has been that we have experienced

a more continuous degree of cold, searching indeed every part of the ship, and affording perhaps the greatest degree of continuous severity on record; thus,—

For 84 continuous hours, mean, — 54·905°; max. — 50°; min. — 59·25°.
48 „ „ „ —57·125°; „ —55°; „ —59·25°.
24 „ „ „ —57·125°; „ —55°; „ —59·25°.

I shall insert also, at this period of extreme cold, the comparative temperatures resulting from our improved measures for warming the vessel internally, or of retaining our heat without detriment to perfect ventilation :—

| | | Difference. |
|---|---|---|
| External air . . . . . | — 57° | |
| Upper deck . . . . . | — 29 | 28° |
| Condenser (main hatchway) | + 23 | 80 |
| Between decks :— | | |
| Bows . . . . . | + 45 | 102 |
| Mainmast . . . . . | + 45 | 102 |
| Gun-room . . . . . | + 50 | 107 |
| Cabin . . . . . | + 40 | 97 |
| Spirit-room . . . . | + 36 | 93 |
| Main hold . . . . . | + 52 | 109 |

It is customary to presume that the Captain will enjoy the greater degree of comfort; but I have a notion (under the fear of contradiction) that he is the most miserable, uncared-for individual in the vessels engaged on this service, and that, in order to watch the interests of all entrusted to his care, his *amour propre,* or general pride, in pursuance of naval discipline, impels him to exhibit

that what he, in his person and place, can endure, all others should submit to without murmur; indeed, the night temperatures, notwithstanding a continuous fire, were intensely felt in my peculiarly weak condition.

There are some individuals who cannot be made to say what they feel, or, indeed, too much inclined to assert that quivering accents do not proceed from cold. For my own part, I do admit the present temperatures to be really cold,—undoubtedly, unpleasantly severe; but, setting aside our own arbitrary expressions or scales of cold, let us inquire what Nature is doing around us. The intensity of cold is stealing, through the sides and thin casings, to the interior of my fire-warmed cabin, heated up to +41°, not too hot in England. But as these words do not convey the meaning I wish to impress, I will just add, that cold is particularly attached to iron, and that it will follow it up most affectionately through the sides, vertically or horizontally, and that even brad-heads, covered with putty and painted over to *misrepresent* wainscot, condense the breath and moisture in pearl-like hemispherical dots throughout my sleeping berth; that if these jewels be removed at night, they are replaced in the morning.

It was the custom for all the officers to meet on Saturday evenings and enjoy a racing game, the board and horses of which were most kindly presented to the officers, etc., by Lord Londesborough; and the effect of assembling a dozen persons for three or four hours was, first, to cause the polished mahogany to stream, and before morning to present a polished surface of ice.

At present the French polish is peeling off, panels

cracking with loud reports, joints opening, and every symptom, to men of common observation, of extraordinary dryness, the result of the absorption of all moisture which the icy surfaces can attract. Abaft my cabin, in two extensive store-rooms, some devoted admirer of Nature's wonders might enjoy himself for hours in studying the splendid gem-studded beams, bristling with the largest and most perfect specimens of ice crystals that, even in fairy dreams, he could have imagined; indeed they were two ice-caverns, and took up greedily every particle of moisture that could flow to them.

Have I sufficiently impressed any one of my readers with the chill which, to a solitary naval chief, should pervade my winter prison? If not, the only mode I can recommend is to volunteer to come out and try such *solitary confinement.* If it be suggested, that it is easy to find companions, I can only reply, that some prefer sleep; and sufficient topics, even in tins of preserved meat, were not supplied to maintain interesting conversation. It is this very scarcity of matter which drives us to seek it from Nature, and even then, without congenial minds to discuss it, alone.

The low temperature to which I have referred is evidently much more keenly felt by those who have been exposed to it, and even by those in charge of watches, under infinitely greater protection, than last season, when our lowest, $-63{\cdot}5°$, was almost unnoticed. But as regards my own feelings, beyond the moment, I am not a competent judge, being at present an invalid.

*January* 31.—The day being peculiarly fine, and temperature at $-40°$, I strolled as far as our first terrace, and

was surprised to notice the floe seaward to be apparently very smooth, all the rough or pack ice being confined to the region near our anchorage;—I use this term now, because we have indeed both anchors down (truly moored). I cannot account for this appearance, except by the inference that the breeze reached the ice about half a mile off shore, and has by this mode filled up the irregularities with snow. The track also of our intended sledge journeys alongshore appears to offer smooth travelling as far as our view extends.

*February* 3.—Our temperatures still continue very low, particularly in a continuous stream of cold, the mean of 102 hours giving as under :—

Max. −50°; Min. −59·25°; Mean, −54·34°.

In my attempt today to examine the outer ice I found the cracks to be numerous, and so loosely filled in by snow that I was unable to venture beyond the pack. Commander Richards, who went beyond, informed me that the external floe is smooth, free from cracks, and is likely to afford fair travelling. The large masses of ice in the neighbourhood of the ship, or particularly ahead of her, present more confusion than I had imagined, exhibiting rents in every direction. Temperature alone could not effect this; I therefore imagine that the surrounding masses, rising and falling with the tide, have proved too heavy for the grounded masses to support.

With reference to the continuous degree of cold registered by us, I notice in Captain Parry's Journal at Melville Island that he experienced fifteen hours at −50°. (The narrative gives 54°, but the tables 50°, as the mini-

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mum; I suppose therefore that the thermometer had a correction applied when the tables were completed.)

"Splitting straws" here is cold work, but where the mind has no time for rest there must be ample food for theory. It is our business to find *facts* to uphold or demolish. The present discussion suggested to me the probability of an average degree of heat and cold due to these localities, within certain parallels, which might be deemed fit for comparison. Fortunately, I had taken the precaution of collecting such documents as would be of interest to me, and I now find, curiously enough, that the following very close comparisons result:—

| | | |
|---|---|---|
| In H.M.S. | Hecla at Melville Island during 273 days . | — 9·07° |
| ,, | Enterprise, Port Leopold . . . . . | —10·44 |
| ,, | Resolute, Griffith Island . . . . . | — 9·57 |
| ,, | Assistance, Northumberland Sound . . . | —10·03 |
| | Mean . . . . . | —9·780 |

This result is truly amusing to me; and to those who do not enter into such discussions, the *cui bono* wet blankets on every scientific discussion beyond their horizon, I would anticipate the question—What do you learn from this? To my mind, much of importance as regards hope; definite orders for my officers, and some diminution of anxiety for those I send forth. Taking the comparison resulting from this season's registry, I find, that we have yet to expect —14·56° more cold before the 1st of June, in order to compensate, or equal, that experienced during the last season; and day by day as this is swept away, so will my confidence in my intended measures be strengthened!

*February* 5.—The weather still remains fine, but the temperature still clinging to —40°. Yesterday, under a change of wind to the northward, a point from which it seldom blows, we experienced a fall of snow, the temperature dropping, contrary to rule, as low as —50°; this was succeeded by calm and a rise to —40°.

After prayers today the bodies of our two men were interred in the same grave, with the customary solemnities. I had already deferred it some days, in the hope of milder weather; indeed, in a great measure, to enable me to officiate in my proper place; but the superstitious feelings of the crew were at work, and I thought it better to stop talking and conclude the ceremony. The service was read by Commander Richards; indeed I suffered severely from the exposure, which sent me to bed with severe rheumatism, or, what I am more inclined to believe, an attack of jaundice.*

*February* 12.—Of late most anxiously have our people been looking for the sun. On the 9th the refracted image was reported to have been seen from the hill, and on the day following the lower limb was reported by Commander Richards from the same position. With the return of the sun, the breeze also seems to accompany it, having blown in heavy gusts from the south-west, and during its greatest force last night the temperature rose from —47° to —36°. I allude to this more particularly, as in former voyages the winds have prevailed from the north and west. We have seldom been visited by strong winds, and never from the north-east to north-west. It is also remarkable that at Beechey Island, when they

* From this I did not recover for many weeks.

experience strong southerly gales on the southern side, where the 'North Star' winters, no such breeze appears to extend up Wellington Channel, or even into Union Bay!

The mean temperature of the last ten days affords the coldest, for the month, which I believe has been hitherto recorded, being ten degrees in excess of any experienced amongst Arctic navigators. When I give this as a record, I beg it to be understood as the corrected temperature of the mean of the ten best standard thermometers, supplied from the Observatories of Greenwich and Kew.

| | |
|---|---|
| H.M.S. Hecla in 1820 | 32·213° |
| „ „ 1824 | 26·445 |
| „ Enterprise, 1849 | 37·570 |
| „ Resolute, 1851 | 32·675 |
| „ Assistance, 1853 | 28·753 |
| „ „ 1854 | 47·145 |

With reference to my own health, none but those immediately concerned may care to know that I suffered; but in cases similar to mine, and where the disease (I mean scurvy) assumes such protean forms, it may not prove uninteresting to the general reader to learn upon what slender threads life may depend. I have before remarked, in the cases of Harriss and Burnett, that I consider the mind to have been materially engaged; and it is still my *conviction* that had hope of immediate removal to England been at all feasible, the lives of both these men would have been saved. But as regards myself, although I had fully made up my mind to die and to rest from my labours in the Crystal Palace, I was determined that I would continue, so long as life en-

dured, to act up to the principle which I had ever maintained, not only in sickness but in all the concerns of professional life, "The man who gives way is lost." In this climate, and under the insidious undermining effects of close confinement, repeated inspiration of a vitiated atmosphere, absence of light, and, still more important, of the wonderful influence of the sun's rays, nothing but determination, and a thorough conviction of the paramount necessity of exertion, will sustain a man in sound health. How much more important then is it to the invalid, seeking almost reanimation!

Reduced as I am, and scarcely able to dress or wash myself, the effort to get out of a warm bed into an atmosphere of 37° required some degree of courage as well as endurance; but the reflection, that one day's indulgence might for ever cut off the power, supported me. Once up and dressed, notwithstanding appetite was wanting to assist in nourishing the body, still the occupation and excitement of the mind continued to afford its own peculiar and wonderful invigoration, for I have almost forgotten to state that, added to an almost hatred to food, I had little or no sleep, and had adopted a system of hourly visits to my cabin during the night.

The theoretical views of this year as to changes at peculiar dates have been somewhat shaken by an interval almost of eight days. I had anticipated a break in the season, or a cessation of cold, about the 13th of February. The temperature, it is true, is but —33°, and the old hands would lead us to believe that this is not too cold, and that even —40° would be bearable. It may be, for matter of boast; but for the feelings and well-

being of my crew it is my business to arrange. I have therefore deferred the starting date to the 20th or 21st, and have also determined to entrust the direction of the sledge force to Commander Richards. Upon the question of "orders" I am particularly sensitive. To my mind they are the touchstone of command. It can only be compared with the horse and its rider: the determination and ability of the latter is conveyed almost instinctively by the rein. The man who issues an order, withdraws it, and then issues the counterpart of the first diminished in vigour, must be an object of ridicule. With me at present I have two uncontrollable matters to deal with—the temperature and the constitutions of my men. To this is opposed the eager spirit of ardent, indomitable courage, of men ready to obey more than I will venture to command. But with me rests the responsibility: success redounds to their credit, but failure reflects on my judgment and capability for command. Can any one in England feel and understand such an intensely exciting position? To send men into action, or lead them, requires no thought. Such deaths as would result are not inquired into,—they die with glory; we are only to be compared to the railway engineers, who are accountable for the loss of every life, even by accident or the visitation of Providence, and our dead, I fear, are ingloriously forgotten.

The absence of Commander Richards at this period will be most severely felt. Indeed the gradual diminution of officers, withdrawn by the successive sledges, will leave me without a companion beyond my kind professional attendant, Dr. Lyall, and Mr. Loney. This may

excite me to increased exertion; and after I once get sight of the invigorating rays of the sun, I feel that improvement must be rapid.

On the 19th of February the temperature varied a little, rising as high as —23°, but has again fallen to —40°, and during the week the range has been between —23° and —41°, mean 34·07°: the sun's rays have not as yet afforded any perceptible increase of temperature, nor do they at present contribute any "cheering light," being greatly impeded by a heavy, hazy, hanging atmosphere. We have just succeeded in fitting sashes into our winter housing, which, I am told, affords a very cheerful light to the quarter-deck, and enables invalids to enjoy exercise under a temperature of —22°, being 17° higher than exposed to the *breeze* outside, or, to the feelings, equal at least to 30° of *endurance*. Notwithstanding all that has been maintained about the travelling temperature of —40° being bearable, I hear less of it this year; indeed I am inclined to think that the estimate has, by common consent, and common sense, fallen to —30°; and even *that* is viewed with some apprehension.

As the preparations were complete, and the parties told off for travelling were about to take their departure, a written address was read to the crews generally, approving, in strong terms, of their conduct last season, and expressing my full conviction that in the important duty on which they were proceeding, the same untiring energy and exemplary conduct would be manifested, and expressing a confident hope that my Lords Commissioners of the Admiralty would be pleased to reward those who had so greatly distinguished themselves.

About nine on the morning of the 22nd of February, yielding to the anxiety of Commander Richards to proceed to Beechey Island, in order to make due preparation from the materials available there for his expedition, and the temperature having risen to —35°, I determined to launch the 'Sir Edward' and 'Success' sledges, the former having seven and the latter eleven men, with Mr. Herbert, the Senior Mate, as his second. They were attended by all our spare population, and two sledge crews were specially told off to relieve them of half a day's labour at the drag-ropes, as well as to report upon the nature of the ice over which they travelled. This report was satisfactory; they parted from them four miles in advance, with a clear floe in view and the men in high spirits.

It is now incumbent on me to state what my plans were, and why I had selected Commander Richards to command this service, instead of, as I had before directed, Commander Pullen; and I feel fully satisfied that my readers will feel with me that until facts, or want of facts, bore more strongly on the possible fate of Captain Kellett's Division, it was not my province to issue orders which could indicate any contemplation of disaster. It must also be apparent to those who will refer to my parting with Commander Pullen, that I had only given him such instructions as would enable him to act if I did not form other views before the spring. From constant conversation during the winter, I saw the necessity of sending the next in command and next in seniority to Captain Kellett; I saw also the propriety of sending an officer to communicate, if possible, to him all my views

—in which he coincided—and to prevent any misconception of my orders, which naturally would become his guide, should any fatal accident have deprived that Division of Captain Kellett. The simplest-minded person would therefore perceive that Commander Richards, only, could fulfil all these duties. His instructions were as follow, and those for Captain Kellett were delivered to him unsealed, and intended to guide him until he met with that officer.

*By* CAPTAIN SIR EDWARD BELCHER, C.B., *Commanding the Arctic Squadron.*

Having selected you for the very important command of the Division connected with the western search from Beechey Island,

You will repair forthwith to the 'North Star,' where Commander Pullen has been instructed to afford you not only every possible assistance in your equipment, but also to accompany and receive from you his ultimate instructions, as in the enclosed packet, directed to him.

2. You will demand in writing all stores which you may require from his vessel, and he is required to man three sledges; commanded by himself, Lieutenant Cheyne, and his Mate or Second Master, or as to you may appear most advisable.

3. To Lieutenant Cheyne, independent of my special instructions to him, you will give the command at Cape Hotham, or, as circumstances may arise, either to him or Lieutenant May.

The post is important, and, without any regard to seniority or rank, it must be maintained by the most efficient you can select before you finally quit Cape Hotham on your return.

4. The sledge force from this ship will include six, with three from the 'North Star,' amounting in all to eighty-seven men, with 4030 rations, the distribution of which is set forth in the accompanying tables.

5. The period of starting from the 'North Star' must be governed by circumstances connected with temperature. Men who have to undergo the extended travel to which your crews will be subject must not be exposed to frost-bites, and I cannot perceive how they can safely take the floe before the termination of the first ten days of March.

6. It is a puzzling question to arrive at any precise period of parallel temperature. The guess of last year, although exact in every essential point, does not appear to conform this season to the general deduction resulting from the reports of my predecessors. Nevertheless, I will advise you to quit on the first decided rise of temperature after the 10th of March, and to nurse your crews from that date until the 23rd,* after which I consider absolute winter at an end and spring suddenly to commence.

7. Your first position will be on the east point of Assistance Bay, where Captain Kellett deposited 630 rations, less probably by 130 taken by the sledge crew which passed to the 'North Star;' 500 may therefore remain, to be examined by the relief parties following your traces.

8. Having reached this position, you will at once be able to discover whether the 'Intrepid' has been in the neighbourhood, or left any record of her movements or those of the 'Resolute.'

9. If any traces be there found, of course it will interfere, in some measure, with your westerly journey, unless the 'Intrepid' alone has progressed.

10. If the 'Intrepid' has left records of her easterly advance, then the orders to Commander Pullen, Lieutenants May and Cheyne, must be vigorously carried out.

11. Your precise duty is, to find Captain Kellett, to deliver to him the accompanying instructions, furnish him with every information he may require, and return to me with all possible despatch.

12. During your journey to the 'Resolute' you will *decide* on the most appropriate positions for depôts. At present the islands appear to furnish the most direct lines. But you must take into consideration that as spring advances they must become surrounded by water and access barred! It will therefore be incumbent on you to fix upon decided points where the crew of 'Investigator' or Captain Kellett may be *certain* of finding supplies without disturbing those especially set aside for the relief of our distressed countrymen.

13. Captain Kellett's second *cache* appears to be "about three miles west of Alison's Inlet," and at present probably consisting of 1000 rations. However, it is probable that Captain Kellett, being detained near this spot, landed the provisions. You will examine the

* This should be 31st, adding eight days for the later season. These orders were written in January.

spot, and if necessary, after releasing Lieutenant May at Cape Cockburn, desire him to leave instructions for its removal to Cape Cockburn.

14. All the depôts for the return parties should be on the mainland, so as not to involve any water risk.

15. Captain Kellett will of course make good the depôts for any who may follow up his track to Cape Cockburn. To that point I shall direct our main supplies to be pushed.

16. On your outward route it will very much conduce to the comfort of the travellers, as well as to their speed, if you designate four distinct points between Cape Cockburn and Assistance Bay as *caches*, for you must consider them to be laden with documents, instruments, etc.; say, Cape Cockburn, Frazer Point, Cape Rosse, and the eastern point of Assistance Bay. These will *ensure* safe in-shore travelling, "even if the water makes."

17. On reaching Cape Cockburn on your return you will give such directions to any officers, commanding sledges, as may appear to you likely to aid the advance of the weak or invalids, either of 'Investigator' or 'Resolute.' If it be possible, I think that one large sledge with provisions up to Byam Martin Island might be very grateful to the retreating crews. But these remarks apply more directly to the sick and feeble, particularly to the crew of the 'Investigator.' They must form the First Division.

18. The Second will of necessity have to remain until the final necessary duties have been completed; and as they will advance, forming *caches*, up to Byam Martin Island, you will assure them of all necessary supplies from Cape Cockburn easterly.

19. I now arrive at a more difficult question;—that is, the probability of finding, before you reach Cape Cockburn, information of the movement of Captain Kellett last season, and of the unaccountable non-appearance of 'Intrepid.'

20. My general measures have been adapted to meet this peculiar matter. Commander Pullen is instructed to cross the Channel to Cape Bunny, and to move on to Port Leopold.

21. You will then have to select such a route as will deviate completely from that pursued by him, taking probably that intended for Lieutenant May; and you will give him one over *a deviating line*, but *ensuring* the visits of two or more officers to Cape Bunny, where I intend to establish the southern turning-post, and divert any travellers from Captain Collinson to Beechey Island, instead of the misery they must inevitably encounter at Port Leopold.

22. In this latter part of your Instructions you will have to bear in mind that you are seeking persons, in all probability, in want of sustenance; and therefore no question of "expeditious travelling" must be suffered to interfere with the full load of provision which may be available; and you must also bear in mind my object of placing on Cape Bunny, on the eastern side of Peel's Straits, a large *cache*, in the event of Captain Collinson coming up that Channel or calling at Cape Walker on a northern march. Especial sealed notices will be supplied for that branch of the Searching Division.

23. By the accompanying table you will understand my final arrangements, by which the entire southern lines will be traversed by Commander Pullen, Lieutenant May, and possibly by Lieutenant Cheyne.

24. Your provisions have been increased in bread and meat, under the conviction that on this second season men should eat all that appetite can render salubrious. Indeed, it must be excited by herbs and other adjuncts supplied. I cannot therefore urge more than the preservation of all which is not consumed.

25. This does not apply to spirits; my own experience satisfies me that the men are enervated even by their present allowance, and, immediately after it is drunk, are not fit for undue exertion. It is possible that it may not injure them before sleeping, but its entire loss would not grieve me.

26. I now arrive at a subject which I would wish to avoid; but the duty I have to perform renders it imperative. I have to report "*instanter*" my proceedings. Under my former orders, unfortunately those of my predecessor, I enjoined journals "*within a reasonable period*" after return. In some few cases they were sent in. But that order, or rather request (for it has not been responded to as an order), I shall supersede. The custom of the service requires, copy of track-chart and report of proceedings. This will enable me to execute my duty; and I decline receiving any further journals, for which I shall have full reasons to give to my superiors, should they require them.

27. You will therefore on your return furnish me, within forty-eight working hours, with your report of proceedings, track-chart, or the one you made use of, and explain verbally any matters I may not then ask for in writing. But your journal of proceedings you will prepare for their Lordships. With matter concocted on board I have nothing to do: it belongs to your private journal. The idea of waiting *three months* for a report of proceedings is too absurd, unless where daily verbal explanation has put me *au courant* with all that I required.

28. You are furnished with copies of my former orders to Captain Kellett, as well as to Commander Pullen, by which you will be guided when not met by these Instructions. You have also my final Instructions of this date to Captain Kellett. These cannot be sealed at present, as they must in some degree guide you; but you will consider them as *confidentially* open to you, and seal them before you deliver them to Captain Kellett.

29. My general orders respecting notices and cairns you will carry out, and without reasons to be explained, those relating to commands of sledges will of course be observed.

30. You will, in the full spirit of the Instructions, draw up, during your detention at the 'North Star,' such further hints for the officer left in command as may prevent any misconception of the duties intended. I will further send especial orders by the next Division as to the second journeys of the sledges to Assistance Bay.

31. Every possible facility has been afforded to you for the most perfect equipment of the sledges placed under your direction; and having full confidence in you, and that your energy will be fully adequate to the arduous service entrusted to your command, I now commend you and your gallant companions to the care of the Great Disposer of events, praying earnestly that your return in safety may be attended with the welcome intelligence of the well-being of Captain Kellett's Division.

*Given under my hand on board Her Majesty's Ship Assistance, this* 15*th day of February*, 1854, *in the Wellington Channel.*

EDWARD BELCHER.

*To* COMMANDER RICHARDS, *H.M.S. Assistance.*

It was not my intention to have troubled my readers with the specific Instructions to Captain Kellett, but events immediately succeeding render it almost imperative.

The original, penned on the 15th of October, 1853, I had considered undeniably distinct, and, had Commander Richards, by demise, succeeded to the command, would inevitably have met with immediate obedience.

*By* Sir Edward Belcher, *Kt., C.B., Captain of Her Majesty's Ship Assistance, and in Command of the Arctic Searching Squadron.*

In consequence of additional Instructions furnished to me by my Lords Commissioners of the Admiralty, it becomes my duty to forward to you certain directions for your guidance.

2. In the absence of any information of your movements since Commander Richards quitted you on the 8th of June, 1853, I must conclude, from your letter of that date, that you are at this moment at Melville Island;

3. Or have made the attempt to reach Beechey Island.

4. Further: the result of your spring searches after Sir John Franklin or Captain Collinson being unknown to me, I am reduced to the necessity of *assuming cases* on which to found Instructions.

5. The first and absorbing interest is the fate of the crews of the 'Erebus' and 'Terror.' Should any *reliable* traces have been discovered, you will of course adopt such decisive measures for following them up as appear requisite, apprising me with all despatch of every particular, and suggesting any matters which may enable me to afford you that vigorous support which such a discovery would infallibly call forth from the fine body of men engaged in this enterprise.

6. You would therefore direct the instant return of Commander Pullen,* so that I may be enabled to double the *caches* which I intend pushing forward this spring towards Cape Capel, in order that the main or midway depôt may be satisfactorily completed without, *if possible*, trenching on the necessary supplies for your parties seeking Beechey Island.

7. Of course the above contingency would entirely change the features of our Expedition, which would date *de novo* from the ensuing spring.

8. Under such circumstances, should the trace prove westerly, I should adopt measures for reinforcing the Western Division by the advance of a ship or steamer to Cape Capel, and forming a new depôt on Byam Martin Island, as well as one easterly, near Cape Hotham.

9. In order to meet any such possible case I have furnished Commander Pullen with a copy of these Instructions. He will himself carefully watch on his advance for any eligible position.

10. And distinct orders will be given to each officer in command of the Commissariat sledges to remain at, examine, and leave his *distinct*

* Then charged with this duty.

*report* on the localities where *caches* may be formed, so that no delay may occur on the eastern route to be taken by returning parties.

11. Failing, however, in this most important feature of my Instructions, I must direct your attention to the next in interest,—the traces of Captain Collinson.

12. If you should discover that he had followed up the track of the 'Investigator,' and it appeared likely to you that he might seek Melville Island;

13. I would suggest to you the necessity of leaving the 'Resolute' there, or at a more advanced position, for his use, and coming on with the 'Intrepid' to the Half-way Depôt near Cape Capel.

14. Of course Commander M'Clure will have left all the necessary information, *not only* at the 'Investigator,' but at every *available point or projection*, which may enable Captain Collinson, without risk, to reach the depôt left by you at Melville Island.*

15. If, on the other hand, you should not discover any trace of Captain Collinson, you will adopt the necessary measures for completing the chain of *caches* up to the Half-way Depôt, at, or near to, Cape Capel. And taking into consideration their Lordships' Instructions to me, you are at liberty to determine, on reaching that locality, whether you will leave the 'Resolute' or 'Intrepid' as a depôt. *One must be left.*

16. You will be guided in the matter, "with or without a crew," with reference to volunteers, provisions, and the physical condition of those willing to remain. But you are clearly to understand my meaning:—that *only* in the event of your being in possession of *sufficiently reliable authority* that Captain Collinson is yet *absent and advancing* are you to leave a crew.

17. It is very clear to my mind that if Captain Collinson has not been *heard of, in time to inform me before next August*, from England, that no good can accrue by leaving a crew behind,—when we well know that they can, if necessary, be forwarded from Beechey Island fully in time to answer any useful purpose.

18. These matters disposed of, I must now revert to the equally important consideration of yourself, officers and crews, now detained by this untoward season. I have, it is true, no possible information to guide me as to whether you quitted Melville Island accompanied by

* He did not prosecute the back search, as I imagined he would have done.

the 'Intrepid,' or whether you despatched the 'Intrepid' forward with the crew of the 'Investigator:' you may, indeed, have been entrapped as the 'Assistance' is.*

19. It is however of the *utmost importance*, and *must yield to every other consideration*, that the crew of the 'Investigator' be forwarded, independent of the uncertainty of open water last season. They must be at Beechey Island, *if possible, before* the middle of June.

20. In order to secure this desirable object, I shall superintend this duty in person, advancing not only sledges but boats to Cape Hotham, and adopt other measures for the retreat of *your entire parties*.

21. If the water should make early and release this ship and 'Pioneer,' one or both may be advanced to your support; but I much fear any release to this ship until the extreme of the season.

22. I shall myself repair to the 'North Star' and assume the direction of affairs there until the anticipated arrival and departure of the relief which will, in all probability, be afforded by their Lordships; for the fate of all, when Commander Inglefield departed, was problematical. His assumption that it was my intention to return to England this season is without foundation, and of this my despatch will inform their Lordships.

23. All will depend on the report of Commander Pullen: he is by me, knows my intentions fully, and will clear up any *doubts*.

24. Unless distinct and unmistakable evidence is adduced bearing on the traces of Sir John Franklin or Captain Collinson, you are to consider that you are hereby directed to rejoin me at Beechey Island with all possible despatch, subject only to the deviations in paragraphs 11, 13, and 14.

25. I think I have now relieved you from any possible doubts as to your mode of proceeding and the intentions of Her Majesty's Government.

26. You will forward to me every possible document by Commander Pullen which may enable me to inform their Lordships of our latest proceedings, and which may possibly be forwarded by me before any possibility exists of your rejoining me at Beechey Island.

27. I have been thus circumstantial in every point in order to free you from every possible misconception, and I have forwarded to you a copy of their Lordships' Instructions to me, in order that you may fully understand their wishes.

* Too true.

28. Having done thus much, and relying fully on your well-tried zeal and ability, I feel assured that *any deviation* will arise solely from circumstances over which *you have no control.*

29. And now, committing you to that merciful Disposer of events who has, on many occasions, interposed his powerful aid in our rescue, I fervently pray for the entire reunion of our at present disjointed Squadron in health, vigour, and prosperity.

*Given under my hand this* 15*th day of October,* 1853, *on board Her Majesty's Ship Assistance, off Cape Osborn.*

EDWARD BELCHER.

*To* CAPTAIN HENRY KELLETT, C.B.,
*H.M.S. Assistance.*

As the appointment of Commander Richards to this service, and maturer thought, had very much confirmed me as to what the country expected from me, I added the following:—

[*Confidential.*]

*H.M.S. Assistance, off Cape Osborn,*
*February* 1*st,* 1854.

SIR,—In my former Instructions of October, I had not so well considered matters as at the present moment, and it occurs to me that I have not been so precise or urgent as the nature of their Lordships' intentions require.

We are not now left to our own feelings, our zeal, or our judgment, and we know not what may be the orders which will arrive in July or August; but I can *foresee** them, and it becomes my duty to meet them in the same spirit. Taking into consideration therefore that similar orders will be given respecting the next steamer, she cannot be retained beyond the 1st of September. Whatever powers may be left to me to await your extrication, I must send home every soul who is useless here, or whose death may result from that oozing out of fancied zeal which brought them here.

You must therefore read the 13th, 14th, 15th, 16th, and 17th paragraphs as definitive orders for *abandonment* to all who are not to stay

* I was right.

*behind*, and I see no use (myself), not being in a position to judge, of leaving a crew if the vessel is safely placed. The facility, or otherwise, of Richards's enterprise will guide you better than anything I can advance.

I prefer, if new hands are sent out, that the depôt shall be at Beechey Island and Port Dundas, of which inquire of Richards.

But bear in mind that the lives of all "*the touched*" must be secured by their presence at Beechey Island before the 1st of September. I may send away 'North Star' even before that date with invalids and 'Investigator's.'

Under every advantage I cannot see the prospect of your release past Cape Hotham before the 1st of September; the steamer might (?); but I have some idea that if you abandon it will be at Melville Island, for I can readily imagine the pains and penalties of such a proceeding before reaching a place of security, and where indeed such an act might be more than hazardous.

I have not the slightest conception how many might be induced to remain out in any of the vessels; but as far as I can see into the constitutions of those who have been out before, and talk most, I should not think it safe to leave *any volunteers beyond Beechey Island*, not for want of spirit, but from the chance of *inability to travel* at the required moment. This becomes a matter beyond surgical advice. We who have commanded so many years know full well how suddenly, without disease, men droop and will not recover,—in fact, make up their minds to die.

I have many men fit to travel forty miles to the 'North Star,' but it would go hard to make them travel from Northumberland Sound had we been frozen in there all this season. Indeed, it is a matter beyond our feelings; and as I can only read 'their Lordships' intentions to mean that a crew was to be left, if I thought proper, in September last: if it be their intention, and they will know if it be important by the failure of intelligence from Captain Collinson, fresh volunteers will be sent from England.

*Captain Richards may however inform you of my reasons for moving east to Port Dundas before the season closes, as I have strong suspicions that the fate of Sir John is to be sought southerly of Lancaster Sound, and the assistance of the interpreter of the 'Investigator' is important.*

I do not perceive that you have taken Commander M'Clure under your command; I therefore, to place this matter beyond any possible doubt, enclose to you the requisite order, and you will bear him and

officers and crew on your books as "Supernumeraries for Victuals and Wages," but not doing duty unless by your order, in which you will be guided by the Admiralty Instructions.

Should Captain Collinson fortunately reach, you will pursue the same course, and not under *any consideration risk the detention of another season.*

*These are the views of Government; and having so far explained myself, I will not hamper you with any further Instructions, than meet me at Beechey Island, with the crews of all vessels, before the 26th of August.*

Trusting to an All-merciful Providence that you may be able safely to effect this, and that we may all meet in health and cheerfulness at Beechey Island,

Believe me, faithfully and sincerely yours,

EDWARD BELCHER, *Captain,*
*Commanding Arctic Squadron.*

*To* CAPTAIN HENRY KELLETT, C.B.,
*H.M.S. Resolute.*

It is unnecessary to trouble my readers with private matters, but my explanatory letter of the 12th of February, which accompanied this, and *demi-official,* runs:—

I foresee their Lordships' next Instructions, and under this conviction have sent you orders *to abandon.* It is impossible to trust to the middle of August; last year the 'Phœnix' left on the 26th, and *I even doubt* if she got home *safely!* I know, my good fellow, how troublesome it is to make a resolution when no orders cover it; therefore I have been *so explicit with you,* and put it beyond the power of those at home to tell me I should have been *decisive* (as they did when Monypenny walked off with the barge). It is clear now that no ship can be of any use westerly of Beechey Island if you secure 'Resolute' in any safe position, for the facility with which Richards will reach you will place such matters beyond doubt. * * *

I have a strong impression that Collinson will either come up Peel Strait towards Leopold Island, or meet Rae and accompany him to the Hudson's Bay Settlements. There too I see a failure: he would not have boats to carry them. But knowing of 'North Star' at Beechey Island, he must naturally be driven to prefer this route, with the certainty of a steamer to take him home in August.

These observations were written under the impression

that M'Clure had tried back and left information for Captain Collinson.

How odd if the steamer had to carry home the Captains of five ships, besides tenders: yet such may be the case! As to poor Sir John and Crozier, that affair must be for ever decided. I firmly believe he was seen in Prince Regent Inlet by the natives, reached Union Bay, there got damaged, and tried to get home. I have never ceased to think about those seams of oakum.

I have a strong presentiment that those natives at Dundas Harbour know something of Franklin, and I shall try hard to get a party down there with the first open water, and hope Mr. Miertsching may arrive in time to join them. They have evidently robbed the depôt at Navy Board Inlet, as Inglefield found the doctors' scales, jars, part of a lime-juice case, etc., among them. They had also robbed the cairns of notices, and who knows, as Ommanney's was purchased last year, that when they return home, finding paper a valuable article of traffic, they may produce some record of Franklin?

Such were the communications forwarded by Commander Richards, and, as I deemed, to a second in command, *decisive*.

## CHAPTER IV.

Land reached.—Ice-gauge placed.—Ice Table.—Second Sledges leave.—Observations on Thermometers.—Absence of North and South Winds.—A Clever Wolf.—Wines frozen.—Capture of a Fox.—Undue Cold.—Indications of the Season.—A Hare shot.—Arrival of Lieutenant Hamilton.—Establishment of *Caches*.—Captain Kellett's Proceedings.—Return of M'Clintock.—Abundance of Game.—Position of 'Investigator' and 'Resolute.'—Insecurity.—Communication impracticable.—Allotment of Crews.—Health of Crews.—Deaths.

I SUCCEEDED today in reaching the land, and strolled along the first terraced level, from which I obtained a fair view of the Channel, and am inclined to think that appearances at present are in favour of our getting out of this trap in summer, if not clogged by Admiralty Orders; I mean, as to imperative return of the steamers sent to our relief. If the open water about Beechey Island permits of the detention of the vessels there, it may be possible that 'Assistance' and 'Pioneer' may be extricated in time to prevent the very great mortification of abandoning our homes and all our valuables; for having experienced one heavy loss in the 'Samarang,' I have no wish to conclude it more decidedly. Two fires are deemed to be certain ruin.

*February* 24.—In November last I alluded to experiments then commenced, in order to determine the very contradictory assertions made as to the ratio in which salt-water ice, or the floe, freezes. In order to test this question satisfactorily, I caused a wooden tube to be formed, having its two opposite sides partially open; in fact, the two complete and parallel sides were simply retained in their position by battens.

This tube was inserted in a hole cut on the smoothest part of the floe, the surrounding ice being of very even thickness, viz. eighteen inches. A cross batten on the upper surface was placed, not only for the purpose of upper level gauge and suspension, but also to determine if any increment took place on the upper surface by evaporation from beneath, or from consolidation of the superior snow by a similar action of escaping vapour; or, in plain terms, two questions were to be solved:—

1. Does the ice increase solely from the water beneath? Or,

2. Does it owe any part of its increase either to vapour escaping (on freezing) by percolation through the crust, and consolidation above?

On radii, from the gauge as a centre, holes were cut every ten days, and the thickness of the ice strictly gauged. The result on withdrawing the gauge at the end of 110 days affords the following table, which, as the batten still occupied its original position, also proved that the increment has been solely from beneath.

The tube was inserted November 5; the upper level, five feet six inches; ice thickness, eighteen inches; space above gauge, eighteen inches.

| Date. | Thickness. | Days. | Rate. | Mean. | Max. | Min. |
|---|---|---|---|---|---|---|
| Nov. 5, 1853 | 18 in. | | | | | |
| „ 25 | 28 | 20 | 0·50 in. | 25·756° | +2° | 37·00° |
| Dec. 5* | 36 | 10 | 0·80 | 24·128 | −12 | 36·00 |
| „ 15 | 39·5 | 10 | 0·35 | 31·936 | −19 | 40·00 |
| „ 25 | 44 | 10 | 0·45 | 28·628 | −16 | 39·00 |
| Jan. 4, 1854 | 54 | 10 | 1·00 | 17·004 | +26 | −46·00 |
| „ 14 | 51 | 10 | 0·35 | 37·228 | −24 | −45·00 |
| „ 24 | 54 | 10 | 0·35 | 43·952 | −27 | 54·75 |
| Feb. 3 | 59 | 10 | 0·50 | 47·362 | −28 | −59·25 |
| „ 13 | 63 | 10 | 0·40 | 45·899 | −33 | −55·75 |
| „ 23 | 67 | 10 | 0·454 | 35·301 | −23 | −45·00 |
| Mar. 5† | 62 | 10 | .. | 32·733 | 16·00 | 45·62 |
| „ 15 | 65 | 10 | .. | 34·629 | 19·00 | 49·62 |
| „ 25 | 68 | 10 | .. | 29·659 | 12·50 | 43·00 |

The table indicates nearly an average increase of ice of half an inch per diem, from which I derive the following inference.

That as the sea is, during the winter, constantly in a condition to freeze upon the slightest decrease of temperature, that Nature kindly interposes her good offices to prevent its freezing *solid to the bottom*, by the compensation derived from the accumulation of heat beneath the frozen crust, resulting from the law of heat and vapour evolved in the act of freezing.

This collection of globules of warm air may be dis-

* There is some doubt about this measurement.

† This concludes the table, as far as the gauge is concerned.

tinctly traced in spring, on the under surface of what is termed honey-combed ice; indeed its action is as wonderfully correct as the boring of the teredo, leaving clean, smooth-bored holes through seven feet ice, as if it had been the result of some sharp auger or cutting instrument.

*February* 28.—The temperatures remaining high, and the anxiety of some of our sledge parties leading them to prefer braving the cold to inactivity, I despatched two more sledges, under the command of Lieutenant May, to the 'North Star,' the probabilities being in favour of temperate weather for the next six days at least.

This being the conclusion of February, I find that our mean for the month is nearly the coldest on record, certainly the coldest for this month experienced by any of our Arctic Expeditions.

| | January. | February. |
|---|---|---|
| Hecla . . . . . | −30·00° | −32·19° |
| Enterprise . . . . . | 35·70 | 35·20 |
| Resolute (Austin) . . . | 31·00 | 32·00 |
| Assistance (Belcher), 1853 . | 40·37 | 29·39 |
| Assistance, 1854 . . . | 40·854 | 40·247 |

In the determination of the temperatures here I must again reiterate the observation, that these results are the mean of thirteen thermometers (standard), and registered two-hourly, so that the results are indisputable. During this season the contraction of the mercurial thermometers below the graduation of −39·5° has been most narrowly

watched. From these registries it is evident that the freezing-point does not confine its further retrogression, and that, after contracting to 41°, or below, it will still indicate a motion above or below 41°, or, in other terms, is not solidly congealed. These observations, noticed in the Appendix, as compared with the action of the spirit thermometers, may afford interesting matter for those inclined to pursue this subject.

Notwithstanding this peculiar disposition of the mercurial thermometers, it cannot but prove a source of great satisfaction to those who have bestowed so much pains on these delicate instruments to learn that, under all changes, both spirit and mercury have been found so closely to coincide.

Another fact, entirely incomprehensible to me, occurs with regard to thermometers used for water purposes, either in the sea or in the wet and dry bulb thermometers; these, although agreeing perfectly before subjection to moisture, disagree completely for many days after depriving them of their covering, or completely drying them. A pair of the most perfect, now before me (belonging to the wet and dry bulb), undergoing cleaning preparatory to fresh clothing, have for three days afforded two degrees of difference! and yet for weeks, during the winter of 1852–53, they coincided at every division!

*March* 4.—I have not progressed towards recovery as I had anticipated; in fact, I learn that this is not a climate to trifle with. Undue exertion of the lungs (reading the service on Sunday) has thrown me back and confined me to cabin exercise. The following ideas have lately been

impressed on me:—1. Never to pass over, as unworthy of thought, after the first year particularly, any symptoms similar to rheumatism, affection of chest or voice, discoloration, emaciation, etc., but at once meet the question by full diet, stimulated even by curries, etc. Exercise is important; injudicious exposure to severe cold should not be risked. This probably has been my fault, or possibly not quite my own, for my preaching has ever been, "not to expose the lungs unnecessarily to a lower temperature than can be avoided." Latterly our upper deck, under the housing, has maintained a higher temperature by nineteen degrees above the external atmosphere, with a complete shelter from the slightest breeze.

*March* 5.—Our last ten-day temperatures afford, min. —45·62°; max. —16°; mean, —32·733°. We have not, for a long period, been visited by any strong winds, but it now threatens in squalls from the south-east or off the land. Notwithstanding it has not yet been felt by us, we are still annoyed by the peculiar whistling aloft, with rapid scud, attended by the unmusical beating of the small ropes against the masts. Upon a careful review of the winds I find that no strong wind from south, round by the *west* and thence to *north*, or over the western half-circle, has prevailed for twenty-four hours, or blown with any force since we have been here, now nearly six months. The question naturally arises, Are we to experience it in July and August, with the ice in motion? If so, our position will be one of intense anxiety.

Upon a cursory review of the documents of Mr. Kennedy, published in the papers laid before Parliament relative to his southern journeys, I notice that at the very

periods which he happens to select for his winter excursions are those on which our lowest temperatures were experienced. This is highly important, as confirmatory of the frequently asserted theory of the maintenance of heat, or rather of a milder temperature, in snow-houses. He may therefore be supposed to have endured in his travels at least 50° to 55° below zero (external atmosphere) in January and February (when we experienced it as low as —58° and —63°), without, as far as I can learn, complaining!

*March* 7.—Frequent allusion to the visit of a wolf has been made in these pages. In their natural state doubtless wolves possess cunning, but this individual seems to have profited by his repeated visits, and had so far become familiarized with our dogs that they have accompanied him, her, or it, and been wounded in their quarrels. These visits, however, prejudiced our chances of obtaining hares, ptarmigan, or even bears; and the ingenuity of our keenest sportsmen was taxed, either to shoot him from the ship, or induce him to commit an act of *felo de se*, by the interposition of a delicate *morceau* attached to a double-barrelled spring gun. For some nights he has been eagerly watched, and last night the report of the gun announced, as every one thought, his destruction, and to our imagination, from the proximity of the bait to the muzzle of the piece, at least headless; but he proved too cunning. He had abstracted the bait by a *side* motion, and this morning was noticed on the hill astern, narrowly watching the proceedings of those engaged in further schemes for his destruction, exulting possibly in his superior intellect. Jack, with his

customary superstition, has declared him "charmed," and that he is one of the officers of the 'Erebus.' It is a ridiculous feeling; yet who is free from it? Indeed, I have been so far, at times, a victim to some such feeling, as even to attach the name of one of my friends to this cunning visitor!

*March* 11.—Further experiments were made today on the freezing temperatures of port-wine, sherry, and lime-juice: these of course would vary according to their respective ingredients. I shall therefore merely observe that the fluids under experiment froze as follows:—

| | |
|---|---|
| The Sherry became frozen (soft) at | 10° |
| Port . . . . . | 12 |
| Lime-juice . . . . . | 10 |

But the latter had not frozen to the core at —10°, which induces me to *doubt* very many reports of jars found broken in the hold, as being truly attributable to low temperature; other fluids, as vinegar and pickles, did not burst the cask-heads!

*March* 15.—Our ice-gauge having been raised, we content ourselves with the simple measurement of the in-shore ice, principally with the intent of discovering the approximate moment when the sea-water season terminates; or when the ice crystals, constantly pervading the sea beneath the floe, cease to attach themselves to the under surface, and thus increase the homogeneousness of the floe. Our thickness today affords sixty-five inches, = five feet five inches, and the last ten-day temperatures as under:—

Max. —19·00°; min. —49·62°; mean, —34·629°; previous, —32·733°.

Our last Division has been delayed to this preconceived date, in the expectation of a decided change of season; and the temperature having risen to —23°, and the wind lulled, I determined to push forward Messrs. Grove and Pim, with the 'Dauntless' and 'Reward,' on the morrow, should the weather continue propitious.

*March* 16.—With a fine fair wind and light hearts, attended by an auxiliary crew, our friends departed, and, as our sledges are now good sailing vessels, and, I may add, well handled, they soon overran their jog-trot speed, sending back our auxiliaries; and, as the breeze shortly after freshened considerably, I trust they may not only make considerable progress, but also keep themselves comfortable by the exercise necessary to keep up with their "craft." Another inducement caused me to send them off today, and that was the probability that Commander Richards would, for the same opinion which I have stated, make this his starting-day from Beechey Island without waiting for their last sledges. The increase of wind here furnishes no clue to the weather a few miles southerly. There abrupt cliffs, varying from seven hundred to eight hundred feet, afford complete shelter from all winds ranging from north-easterly to south (true); and when we experience a gale here, they may be in perfect calm: at times however they may experience a gale from the opposite quarter! Our return party reported that Grove had captured a fox (in one of our indefatigable Boatswain's traps), "and persuaded him to volunteer to accompany them to Beechey Island."

In all cases where theories are advanced and reasons appended, it is but fair to state when and how they fail.

They are but guesses, founded, it is true, on what Nature has warranted. By the ordinary course of reasoning, this gale, to which it has at length arrived, should have terminated, or blown out, at 1.45 P.M. today, or, by the other law, commenced and continued for fourteen days. In these latitudes, however, no gales blow continuously beyond twenty-four hours, and our sure guide "of its heart being broken" is the diminution of temperature; below −40° it does not blow hard, and at −60° wind is not experienced.

But our winter here must be something akin to Napoleon's estimate of some of the Duke of Wellington's battles—"He ought to have been beaten." So in our case, according to the minimum degree of cold diffused over the same number of days in preceding seasons, the amount due to the year has already been exceeded, and we have every reason to expect milder weather; but stern Winter says, No! and to no human being here incarcerated is that "No" of such importance as myself,—or rather to this service, as regards my intended journey to the 'North Star' before the 1st of May.

*March* 19.—The breeze has failed and the temperature again fallen to −40°. We have not been visited by the old noises termed "bolt-breaking" for some time, but last night the outer ice evinced great uneasiness, and reports of heavy and repeated cracks were heard during the whole night. From the report of those sent to examine the outer ice, I gather that the exterior ice already exhibits large rents, and the fissures generally seem to indicate a probability of off-shore leads whenever the ice is relieved from off-shore pressure. To those accustomed

to view these matters it will of course be apparent; but to the uninitiated it may be necessary to explain, that this dislocated state of the off-lying *pack* affords us better grounds for release than if we had been frozen up in smooth continuous floe of equal thickness, as the pack invariably falls asunder at the first thaw, and may either float off or be compressed into smaller space, and thus afford space for *motion*, the great desideratum in these cases; on the other hand, when the floe is continuous and of equal thickness, it is only disrupted by forces which would entail destruction on our insignificant vessels.

My own conviction is, that no opinion as to ultimate release can be formed on this side of Beechey Island, and then not before July or probably until the 22nd of August, notwithstanding the unprecedented open water found here on the 14th of the latter month in 1852, and that, as it appears by reports of not many hours later, was closed almost to boats.

Last year Commander Pullen, on his first journey to Cape Becher, on the 10th of April, found the ice very treacherous with many pools of water; but then we experienced many warm days during the months of February and March. But the open water *above* our present position and that *below*, or southerly to Beechey Island, are dependent on very different conditions. We know, from actual experience now, that the Polar Sea may be open and in active motion as early as the 18th of May, as noticed on that date from Britannia Cliff, and we also know that the sea was open on the 14th of July, last season, at Northumberland Sound, yet still sealed

near Hamilton Island late in August. But to my mind the cause is very clear—as clear as the North Sea and British Channel flood-tides meeting at high water near Dover. North of our present position, the flood-tide sets in from the Polar Sea and brings its warmer oceanic water; southerly, the flood has to pass up Lancaster Sound, then to be deflected up this channel, and makes high water somewhere between this and Beechey Island; hence the inaction in this particular neighbourhood when the sea may be open both *above* and *below*, and even if open off-shore, may never release this ship from her present prison. But until every matter requisite for her extraction is fairly prepared, and nothing left but taking advantage of the first lead, I do not quit my post here.

*March* 22.—Today my Coxswain, George Stares, one of Sir John Richardson's crew in Canada, asked permission to take the gun to try for some game for me, and before noon returned with a fine young hare of last season, a male, weighing ten pounds, but when his skin and entrails, etc., were taken away, not above four pounds of meat remained; his food had been lichens, grass, etc. The arrival was somewhat opportune, as the very mention of food had become almost unpleasant; but the hare, if not overcooked, I could attempt, and with some degree of *goût*. The evil of all the preserved meats supplied for this service is, their being overdone and unpalatable to a tender stomach.

*March* 26.—Yesterday the ice gauged five feet eight inches, which exhibits but very slight increase during the last thirty days. Indeed it is my intention at the expiration of the next term (on the 4th of April) to lift

a large cube, in order to ascertain if the honeycomb, due to any increase of temperature of the sea, can be detected. The result of the temperatures for the last ten days affords—

Max. −12·50°; min. −43·00°; mean, −26·659°.

I was enabled to attend prayers today, but found the lower deck, although warmer than my cabin (as 46° to 50°), oppressively cold. The temperature at the main hatchway ventilator was at 34°, and probably the air close to the deck proved too cold for my feet, by which extremity I suspect most of our feelings are sensitive. The weather externally at present is calm, cold, and without any cheering heat from the sun's rays.

*March* 30.—It is remarkable that persons boxed up in this climate, and deprived of the ordinary variations of everyday occurrences in the busy world, seem to derive the faculty of "seeing ahead." Nor is it confined to educated beings, for we find it occasionally amongst the Esquimaux and Greenlanders; and since we have been in this region it is remarkable how all our discoveries, orders, and operations have been so perfectly made to dovetail or fit into each other, or our thoughts indicate some peculiar relation to realities at hand, is even wonderful; for myself I must confess that it has a very solemn effect, and causes me to think very seriously.

"Coming events cast their shadows before" was never more fully realized. Today I felt so perfectly satisfied that a sledge from Kellett was due (if he existed), that I fully intended, when the Master reported noon, to desire him to send a person to look out on the hill. It escaped me, being then engaged on other matters; but my clerk

coming in from taking the temperature of the Crystal Palace, reported "A dog-sledge nearly alongside, Sir!" My reply, instigated by what was then passing in my mind, was very short, and without emotion, "*I know it,*" which somewhat astonished him; but fortunately I explained my meaning, which perhaps led him to imagine I was dreaming.

At 12.30 Lieutenant Hamilton, attended only by one man and the dog-sledge of the 'Resolute,' reached the 'Assistance,' being the bearer of letters from Captain Kellett, which informed me that the 'Resolute' was frozen in the pack twenty-eight miles south-west by south from Cape Cockburn, having been blown out of "Winter Quarters" off Dealy Island on the 18th of August last, during the gale which had thus nearly proved fatal to the whole Squadron.

All our sledges had reached the 'North Star' safely, and Commander Richards had started on his expedition before the arrival of the two last sledges under Mr. Grove. He did not meet with Lieutenant Hamilton, but had fallen in with another sledge from the 'Resolute,' about ten miles to the eastward of Cape Hotham; and having obtained from her officer full particulars as to where the 'Resolute' would be found, lightened his sledge of some of her load, and pushed forward. Delighted I was to see Lieutenant Hamilton, and to learn from him that all were in good health and spirits.

It is necessary that I should now refer to the state of our affairs generally; and it will be perceived that in so far as the movement of the 'Resolute' is concerned, it was compulsory, and that the probabilities were, as I ap-

prehended, of his not experiencing a navigable season; indeed, the choke of the Wellington Channel and Barrow Strait, by the quantity of ice forced into Lancaster Sound, rendered any navigation on the western line impossible. I had hoped that the 'Resolute' would have been found secure at Melville Island, that she would have wintered there, and thus have been left in a condition to succour Captain Collinson's party, should they march in that direction. In furtherance of a continued chain of posts, where *caches* would be established, a fleet of sledges were now engaged carrying forward the necessary supplies, so that independent of any aid to Captain Kellett's crews, sufficient would remain for others who might arrive after he had abandoned or withdrawn his crews, to sustain them along the same route.

In addition to these measures Commander Pullen was despatched to examine and make *caches* at Capes Walker and Bunny, at the entrance to Peel's Channel, and to leave notices at the projecting points on the route to Port Leopold, which would acquaint travellers that relief should be sought at Beechey Island. He was further strictly to examine and report upon the stores left at Port Leopold, where he would leave complete documents for the guidance of Captain Collinson, should he adopt the course up the western side of Prince Regent's Inlet, and also inform him that a vessel was expected from England in August at Beechey Island.

This matter therefore, of the present position of the 'Resolute,' as deduced from the correspondence of Captain Kellett, did not at all cause any change in my opinion or determination, for to my comprehension her

rescue this season was a game of *chance* to which I would not become a party, or subject myself to the hazard of disobedience to what I *knew* (and I speak not at random or without *high authority*) was my *duty*.

But supposing I did not possess irrefutable documents in support of my determination, a *determination* for which I was, I may assert, selected for this command, I could only draw the conclusion from the entire correspondence forwarded to me, public as well as private, that *doubt* was involved. Let me calmly ask, who was to decide as to what the duty of the superior was?

The following, being the official letter of Captain Kellett to me, will communicate all that may be required of his operations since Commander Richards left him in June, 1853.

No. I.

"*Her Majesty's Ship Resolute, February* 10, 1854.
"*Lat.* 74° 42′ *N., Long.* 101° 2′ *W.*

"SIR,—My letter of the 8th of June, with the documents accompanying it, will have given you a concise account of my proceedings and intended movements up to that date. I beg now to transmit papers containing information relative to this part of the Expedition, with a report of proceedings since that time.

"Commander Richards left 'Resolute' on the evening of the 8th of June, at four P.M., and Dr. Domville arrived on board here at one A.M. on the 10th, bringing me the information relative to 'Investigator's' crew, contained in the accompanying documents. It will be readily seen from them what would have been the result had their Lordships not determined on detaching a portion of this

Expedition in the direction of Melville Island. I accompanied Commander Richards on his first march from 'Resolute,' so that when I received the information of Dr. Domville's arrival, he was too distant for me to overtake him with any party I had to send.

"Lieutenant Hamilton returned on the 21st of June, after an absence of fifty-four days. He visited our preconcerted rendezvous, and brought me from it your despatch addressed 'Secretary of the Admiralty,' your letter respecting it, and a private letter for myself.

"Lieutenant Hamilton brought his party in, all well.

"Lieutenant Meecham arrived the 6th of July, having been absent ninety-four days. His party all well, with the exception of one man, who has lost, I fear, the sight of one eye.

"Commander M'Clintock returned on the 18th of July, after an absence of 105 days. The ground being clear of snow, and very heavy, the ravines running with impassable torrents, obliged him to abandon all his equipment on the north side of Melville Island, about two miles distant from the shore of Hecla and Griper Bay. He walked in with his crew, carrying their knapsacks and a few provisions. All safe and well.

"The accompanying tracing, with an abstract from my travelling table, will show you the extent of coast that *has been searched* (without finding the slightest trace of man ever having been on it before), and what has been added to our knowledge of the country by the officers and crew of this ship. How ably and zealously they must have done their duty to cover so much ground: 1618 miles *discovered* and walked over!

"The 'Erebus' and 'Terror' getting through Wellington Channel will (I have every expectation) have been found by you to the eastward of your position; had they got westerly, some of our parties would certainly have found them. I do not think more can be done west and north of Melville than has been done, even if we knew of the existence of land from any position attainable by ships through Lancaster Sound, until we have some other means of travelling.

"I have been most successful in procuring game, and that of some size,—musk-oxen and reindeer, which enabled me to serve 1½ lb. per man per day for some considerable time.* This was not obtained without much labour and method. My principal hunting grounds were distant from the ship twelve to fifteen miles. I have had five hunting parties away at one time; besides, every encouragement and facility was given to sportsmen to hunt the country in the neighbourhood of the ship,—*small game*, geese, ducks, ptarmigan, being considered as their property. You cannot conceive how this good living, exercise, change of scene and prospects improved the 'Investigator's' crew and invigorated *my own*, who returned to me healthy, but thin, and voracious as hawks.

"This country, it may be said, teems with animal life from the middle of May to the middle of October; but I *do not* think a large party of *Europeans* could support themselves by *hunting*, even during these months. The animals soon become shy and scarce, fuel for cooking scarce, and hardly to be obtained at all when the ground is covered with snow.

* After breaking out, reduced to 1 lb. per man.

"We have had during the summer—June, July, and August—very mild weather; an unusual quantity of rain, but *little wind.*

"It rained in June on 5 days, 9 hours hard, 24 rain, 6 drizzle.
" " July, 11 " " " 33 " 57 "
" " August, 6 " 6 " " 49 "

"August having arrived, with little appearance of a break-up, I sent Mr. Nares (Mate), with a boat and crew, to report on the practicability of getting along the land in water. He returned in three days, not being able to cross Beverley Inlet or to get along its shores. Were the land continuous between this and Beechey, the voyage, late in the summer, might, I consider, be easily and rapidly made. Mr. Nares could see no indication of a break-up to seaward. I now began to despair of breaking out at all; the disposal of a part of the crew, to save provision and to give room, became an object of serious consideration. I had a large sledge for carrying a boat made; but as it was impossible a party could have got down to Beechey in time for any ship leaving for England, and that the depôt there would be less able to support the party than this ship at Dealy, I abandoned the project, but determined, as soon as all hope was at an end, to send a party of twenty-five officers and men, under either M'Clintock or Meecham, to 'Investigator' to winter, with orders to visit, by Prince Wales' Strait, the Princess Royal Island and Nelson's Head (south end of Baring Island), to deposit at these places records, and to endeavour to find out from the natives whether 'Enterprise' had been seen by them. We may get along the American coast, and get into the strait discovered by Sir

James Ross, now called Ommanney Inlet. To show you how suddenly changes take place, the report from the summit of Dealy Island on the morning of the 17th of August was—little change in the ice, a few more cracks, but of no extent. The day commenced with light southerly winds. We had foot-races, wrestling, jumping in bags, etc., on Dealy Island, all hands attending, even my poor invalid Mate, Mr. Sainsbury, who had now greatly improved in health and spirits. Towards evening the wind began to freshen from the south-eastward, and at eight P.M. blew a very strong gale; too much drift to see what was going on outside. A crack that was scarcely observable a day or two before, between us and 'Intrepid,' at midnight opened out to some feet. I tried to moor the piece, to keep us from jostling. At two A.M. (18th) the wind shifted suddenly to the northward, blowing a furious gale. The piece between us and 'Intrepid' went out, the whole floe breaking off *at our sterns*, left us fast by our anchors to a good heavy old floe, and in open water; this soon followed, and away we went driving together until we came up with the ice astern of us, luckily in a hole of water. We held on by this piece as long as we could: it did more for us than we could do for ourselves. Slewing, it carried us round on to its weather edge, where we pounded for a few hours, having only a little broken-up stuff to fence off the lipper that had now got up.

"At six P.M. we managed to get off, and made sail, running along the land to the eastward: slowly water making as we progressed. At four A.M. on the 19th we had 'a block' for an hour off Point Griffiths; passed it,

and stood along the pack edge in the direction of Byam Martin Island. Here we were stopped; lanes into the pack, but nothing that I could attempt to take. We beat about for the day with fresh north-west winds, our water being seven or eight miles south and east of Griffiths, and a good deal of water to the northward, in the Byam Martin Channel. Hoping to get to the northward of the ice driving down this channel and then easterly, I went up it in tow: after getting up some distance the pack approached, and appeared to join it ahead. I made fast on its edge in very thick snowy weather, the wind shifting to the eastward of north, shoaling my water suddenly from seventy to twelve fathoms. I was obliged to run into the pack, so as to have sea between me and the shore. We now remained beset, driving up and down in thick weather, for two days, having very variable soundings. We got into open water again on the 23rd A.M., ran down the pack edge to the southward and eastward, found it all tight, beat about for the day, in the evening made fast to a piece of land floe north of Point Griffith; from that time until the 6th of September the winds were constant, between south and west-south-west, mostly light, the pack closing right up to the ship and opening for a mile alternately, with leads into it easterly for four or five miles. On the 7th the wind returned to the north-westward, a fine fresh breeze. This I conceived would have been the moment of our release; the pack went off rapidly. After freeing myself from the young ice, which now began to make very strong, I ran off to the pack edge and followed it to the south-eastward, until it turned up to the westward;

found it all tight and more compact than it was for several days before I returned to my old position. Sent the Master to get soundings along the floe edge we were fast to, supposing the season so far advanced that this would have been my winter-quarters. There was water along the land to the westward, but at this time last year Skene Bay was closed, and the position under Griffiths I consider as safe as my former under Dealy Island. The increased distance would have been no obstacle to my putting in execution my former determination relative to the disposition of the crew. It blew very hard from the north-west, with heavy drift and very cold, until midnight of the 8th, when it suddenly cleared; no ice in sight; slipped and ran off, but hardly got off more than three miles before we were *brought up* with sludge ice fourteen inches thick, with the pack to the eastward of us, and became perfectly immovable. 'Intrepid' was *just* able to get through it; after three or four hours she got the ship's head round with wind and steam. We just got back to fast ice before the wind increased again to a strong gale with a heavy drift.

"At three A.M. of the 10th the wind again lulled; the drift fell. Leaving the ship fast, with orders to get up provisions sufficient to complete 'Intrepid' to a year for seventy men, should I find it or consider it practicable for her to get down without 'Resolute,' I left in 'Intrepid,' steering for centre of Byam Martin Island; we soon got into sludge, but found it much lighter than the day before; we got about half-way over, or about eight miles from the ship. Finding that 'Intrepid' could get along well through it without steam, we hauled our wind

at noon and made ship signal to close; she joined at 4.30 P.M., when all sail was made for south end of Byam Martin; in this direction most water was seen. The direction of the wind our guide; we were brought up about six; it was impossible to retrace our steps; we still struggled on, using every means to get into the numerous patches of water about us, at intervals going two or three knots, and bringing up until eleven P.M., when the stuff packed so heavily on us that both vessels became fixed. At midnight we had a very heavy squall from the northward, which continued to blow furiously until morning. Land was supposed to have been seen on both beams. We now went driving, fixed in this young sludge ice, *nearly* in the direction of every wind that blew; still I had hopes that a westerly wind would break it up. Innumerable pools of water to be seen all round us, yet, with all the means at my disposal, I could not even slew the ship's head round to the northward; powder only increased our difficulties, filling up every space we cut with saws, by detaching the young ice doubled under us some feet below our keel. We continued driving in this way until the 12th of November, pretty quietly except at the spring tides, when we had a little crushing up round us, driving over young floe (very unpleasant, certainly), with much row and noise, but little danger; we were fully prepared for the worst, sledges lashed, parties told off under their officers, with everything on deck ready for flitting.

"What a disappointment to a man's hopes, after breaking out so well and so easily! To get down the *Strait* I certainly thought easy, but there is nothing certain in

this navigation from one hour to the next. Between the 10th of September and 12th of November, twice in the floe, we made a *beating* voyage down this Strait; we only made westing on two occasions, showing that there is a permanent easterly current; a good example of the way the Great Polynia may be navigated in the winter.

"Thus ends my spring and summer proceedings.

"Winter had now really commenced. I was anxious to communicate with you, and had a party prepared for the purpose, *but it was impracticable;* the floe was so much broken up that a boat could not have been taken over it, and there was still so much water or light ice that it would not have been safe without one; in addition, there were only seven travelling hours of light.

"On the 14th of November, Mr. Sainsbury (Mate), whose decline became rapid from the moment we lost hopes of getting down, and the cold weather, died. Poor fellow! the prospect of getting home, coupled with the ability and kindness of my Surgeon, was all that sustained him so long.

"It now became a matter of great consideration, the *victualling* so large a number of men in addition to my own crew, after having expended so much in travelling, placing depôts, and feeding increased numbers, so as to sustain them in health and give me the means of saving my ships. The result was, I found that, with a very small decrease of the allowance, I could victual all until the end of April, and have for myself, reducing *my crew* to fifty men and officers (*both vessels*), provision to last me until May, 1855, before which time *I hope to be released, or to be within the reach of succour.* To

have reduced the allowance would, I felt, have been to lose a large portion of the crew their Lordships sent me to assist; therefore I *did not reduce* the allowance: besides, no reduction I could have made would have enabled me to stay by my ships during the winter of 1855–6 without being assisted, which may be done yet, if we are so unfortunate this summer as to fail in getting through.

"My (intended) proceedings, *unless I get contrary instructions from you*, will be as follows:—

"1. To despatch two parties (one men, the other dogs), under Lieutenant Hamilton and Roche (Mate), to Beechey Island as early as practicable in March; the dogs to be employed, with Mr. Roche as their leader, in case *you* have not reached Beechey, in carrying these despatches to you, and the men to return to me with information.

"2. An officer, Mr. Court, of 'Investigator,' accompanies these parties, who I propose shall be sent to *Port Leopold*, with a strong party, to survey and arrange the stores there, to *leave a chart there* of all that has been done, and *all* information relative to the Squadron and depôts of provisions for Collinson. A copy of Mr. Court's survey to be left in the Beechey house. This officer was with Sir James Ross, and will execute this service zealously and well.

"The 'Investigator's' officers and crew, together with the officers of this ship and the men who are the least able to stand a further winter in this climate (all amounting to eighty-three men and officers) will leave in three divisions for the depôt at Beechey Island, in

the month of April, all arriving there by the 1st of May. I will accompany myself the First Division, to communicate and receive instructions from you, or, should you not be *there*, to give Commander Pullen instructions for his guidance; after which I shall return to my ship, to await the break up of the ice. I will not allow myself to consider the possibility of there being *no* ship at Beechey, or no resources. Even under these circumstances, I must endeavour to get the same number away.

"I should like much to send a chosen few home by way of America, or right on to 'Plover.' It is practicable now, I think, with the depôts, etc., laid out.*

"The employment of my crew until the commencement of the thaw, 7th of June, is all I have now to enter on in the way of proceedings. I hope *to be able* to visit Dealy Island, 'Investigator,' and Princess Royal Islands, besides getting a little fresh meat from Cape Cockburn in the shape of venison.

"The 'Investigator's' officers and crew are sixty in number,—one Commander, one Lieutenant, one Master, two Surgeons, one Purser, three warrant-officers, and fifty-one seamen and marines.

"I propose to send from 'Resolute,' for your disposal, Lieutenant Pim and my three Mates, with twenty-one men. I very reluctantly part with my Mates; they are noble young men. I shall deem it a favour if you, as Commander of the Expedition, will acquaint them with my high appreciation of their conduct whilst with me.

* If he had made such an attempt, how utterly injudicious would it have proved!

Mr. de Bray leaves with the goodwill and good wishes of *all*, officers and men; he has done his service much credit, which I shall take an opportunity of stating, in justice to him, in a separate letter.

"The health of the crews during the winter has been better than I could have anticipated; the good effect of the spring feeding manifest. The very superior quality of our provisions, of *every* sort, with the many comforts supplied us, assisted materially in keeping the men in the same condition nearly as when we commenced the winter. We continued to serve out weekly musk-ox beef until Christmas Day to the whole crew, retaining sufficient for the *sick* and those the Surgeon considered it necessary to place on the diet list. These men, except at the Surgeon's express wish, have not had a bit of salt the whole winter; nevertheless, I am sorry to say, we have had some losses.

"Mr. Sainsbury, Mate of 'Investigator,' died on the 14th of November, of confirmed disease of the lungs; he, poor fellow, was brought over to me on a sledge. This is the only 'Investigator' I have lost.

"Samuel Hood, R.M. ('Intrepid'), died 2nd of January, 1854; James Wilkie, seaman ('Intrepid'), died 2nd of February, 1854. These two men's deaths, no doubt, have been hastened by the severity of the climate and the trying nature of the labour in travelling they had to perform, acting on already diseased organs and shaken constitutions. I have at present two very ill; one, seaman ('Investigator'), with scrofula, ill these last two years; the other a Marine (of my own), improving. These are the only two that will not be able to pull their pound down

to Beechey. Send the dogs back for me, if you want me quickly (I hope to start my First Division on the 1st or 4th of April). The men you will find fine fellows, up to any work you may have for them; only return them to me by the 7th of June.

"I have now given you all information; any that I may have omitted Mr. Hamilton and the papers accompanying this will supply.

"Trusting that you may have reached Beechey Island, and all in possession of health,

"I have the honour to remain, Sir,

"Your obedient servant,

"HENRY KELLETT, *Captain,*
"*H.M.S. Resolute.*

"*To* CAPTAIN SIR E. BELCHER, Kt., C.B.,
"*Commanding Arctic Expedition.*"

"P.S.—My only wants for the ensuing year are preserved meats and tea, travelling pemmican, and fuel, with some balls of hemp and soles for boots, and physics. (See our return of provisions, and scale of present victualling.)"

## CHAPTER V.

Dangers of Autumn.—Recovery of 'Investigator's' crew.—List of Game.—Food, but not Fuel.—Rain at Melville Island.—M. de Bray. —Mean Monthly Temperatures.—State of the Ice.—Increase of Sea Temperature.—Shock of the Ice.—Arrival of M'Clintock.—Correspondence on Abandonment.—Force devoted to Assistance.—Return of Shooting Party.—Extreme Cold beneath the Snow.—Experiments on Snow Covering.—Establish four Posts for Sledges.

THE following is from the customary correspondence, not private, but demi-official and explanatory: all private matters omitted, as well as those not bearing upon the critical position of the 'Resolute.' It is evident no open water was noticed before August 18th, and the 26th, that season, closed even upon Beechey Island! This winter also has been infinitely more severe.

"There must have been a sea of water here, but so late that the sludge which brought us up (sticking like birdlime) must have made as fast as the pack went easterly. There must always be a block amongst the islands *until the season is far advanced,* when the strong winds break the floe up into pack sufficiently small to get through. You will see, by the chart I send you, how I have been driving about these straits, and also that there

is a constant current throughout to the eastward. I am well into the Strait; *still, if it breaks up at all*, I must get through (*unless I get smashed*), and, I think, south of Lowther; *but it will all depend on the wind*, of which we have but *little* this winter, so I hope for a good share this summer. *Should I get smashed* (which, light as I am, I do not *think* will happen), I must seek some of the depôts *east* or *west* of me." Matter here connected with other parties, but which merely served to strengthen my opinion as to my duty, I must omit. "I hope to be able to visit Princess Royal Island and 'Investigator,' and to bring back from Dealy a few preserved meats; that is, if you think I ought.

"Be sure you write me a long yarn of all you have been doing (privately, as you did before), and be honest in your opinions of my proceedings.

"Send back the dogs for me, and I shall be with you in no time; but do not put yourself out of the way to come this road, for there is nothing to be *seen* or *done*.

"We have had the weather *intensely* cold in February; the mean for the month —41°."

The tenour of this correspondence is to the effect that all has been done that could be done; that the vessels might be *smashed*, and that notwithstanding my orders to return were *positive*, even to be at Beechey Island in the *summer of* 1854, that such intention of the Government was to be frustrated, and the further dilemma of keeping out one or more ships, to look for the shattered remains of these vessels and crews, incurred.

So far, then, from altering my views, I came to the conclusion that before any discussion could arise which

might shake my decision (from any private feeling), it was my duty to pursue measures for relief and immediate abandonment; not without sound reasons, for it was clear to me, after discussing the matter fully with Lieutenant Hamilton, one of the most intelligent and active officers of this Squadron (a Lieutenant of the 'Resolute') and standing high also in the opinion of Captain Kellett, that the 'Resolute' was too far off the northern shore even to *save the crew*, should any sudden "run of the ice" break up the *pack*, which, as before described, invariably tumbles to pieces before the even homogeneous floe, subjecting the vessels to be ground between them, or, as in the case (then unknown to Captain Kellett) of the 'Breadalbane,' annihilating her instantaneously.

But what does the public letter of Captain Kellett indicate, even at the end of the season in winter, in proof of my views?

"Winter had now really commenced. I was anxious to communicate with you, and had a party prepared for the purpose, but it was *impracticable;* the floe was so much broken up *that a boat could not have been taken over it*, and there was *so much water or light ice* that it would not have been *safe* without one."

If such danger was manifest after *the winter had really commenced*, infinitely greater danger would attend the deserting of "a nipped vessel" over far greater difficulties of loose ice without the chance of becoming solid by frost! Our Division, and myself personally, had practical proof of this difficulty, when cut off at Hungry Island in October of the same season, and the distance intervening between us and the mainland did not exceed *two miles*.

Moreover, excepting where vessels are nipped and destroyed *in contact with sound floe*, the salvation of the boats is problematical, and should such a misfortune occur all hands must perish!

But to return to the 'Resolute,' her tender, and the 'Investigator.' Early in March last, Captain Kellett had despatched a Lieutenant and his Surgeon to visit the 'Investigator,' and report upon the condition of the crew, etc. Unfortunately the Lieutenant left the Surgeon tented on the ice and proceeded alone, and Commander M'Clure returned with the Lieutenant to the 'Resolute.' Commander M'Clure was still anxious to be afforded another chance of getting through; and Captain Kellett, yielding to his wishes, despatched his Surgeon with him to survey the crew, and should twenty volunteers come forward he might remain until the next season. But they were unfit; they had been reported to me *demi-officially* as in a deplorable state; in the words of Captain Kellett, "they were in a *terrible condition*, disorganized in addition to disease:" more I will not divulge.

What then were my feelings, what my *duty?* As the Commander of such an Expedition, possessing the entire confidence of Government, was I tamely, with such matter in my hands, to betray my trust? Could I lend my approval barely to what I have divulged? and if the matter before me did not warrant my disapproval of *an instant's delay* in conveying the crew of the 'Investigator' to England, had I not ample ground in declining further risk of life, further anxiety to the public, and the additional expense of leaving behind three vessels? for

leaving the 'Resolute' and tender involved another at Beechey Island. Fortunately, all the sick reached the 'Resolute' safely, and by the judicious arrangements of Captain Kellett and Dr. Domville, by employing them detached in tents, killing game and consuming it fresh on the ground, they derived the double advantage of the true unfermented juices of the meat before they were deteriorated by freezing, as well as healthy and exciting exercise for body and mind in an atmosphere rendered more salubrious by the progress of summer vegetation.

Mr. Sainsbury (late Mate, but promoted to Lieutenant) had, from being considered in a hopeless condition, so far rallied and progressed towards convalescence as to be able to take exercise and witness the games in which the crews were enjoying themselves at Dealy Island on the day the vessels were blown from their winter quarters, that eventful 18th of August which afforded us a safe haven at Port Refuge and cut off the ever-to-be-lamented and heroic Bellot.

To Captain Kellett's letter I must refer the reader for further information. Nothing westerly, at all bearing upon the traces of Sir John Franklin, has been discovered, and I think we may safely now assert that these regions eastward, westward, and northwards even to the Polar Sea, contain not a trace; and from my own observation I never have ceased to think, from August, 1852, that he never passed northerly from Beechey Island.

As to the chances of his having passed into the Polar Sea without leaving a record, I have but too frequently expressed my opinion that if such an event occurred, search is beyond that discretion which any sensible man would

exercise. It is easy, perhaps, for courageous chamber theorists to work themselves up to the sticking-point and imagine what their Quixotic spirits would impel them to do. But to such self-sufficient heroes I would offer "*ships, stores, and men;* but if you wantonly lose a life, at your hands I demand the sacrifice." Men who command must feel for the lives entrusted to their keeping; and good men do not follow mad-brained fools.

The distinct increased dimensions of all the floe ice noticed to the westward, as well as northward, of the Queen's Channel, is, to my mind, satisfactory proof that it belongs to another sea and has no connection with Baffin's Bay, Lancaster Sound, or the Wellington Channel; and although it may have considerable *motion* in summer, I yet believe that in the Victoria Archipelago, as in the case between Banks' Land and Melville Island, it remains unbroken for years, even ages. With reference to the evidence given before the Arctic Committee, as to the security of Erebus and Terror Bay, we have too good reason to know to the contrary, and that there is not a more unsafe position in these seas; nor do I believe that the vessels of Sir John Franklin ever cut into that bay sufficiently deep to occupy the position imagined. But upon the matter of being blown out, we have now more facts to argue on, and we feel *assured* that with a northerly gale instead of southerly in 1852 and 1853 the 'North Star' must have been destroyed.

Pursuing however the questions relating to our more fortunate friends of the Western Division, I cannot omit inserting here the report of game captured, and adding that about a dozen hares and the same number of ptar-

migan comprised the total collection of our Northern Division.

H.M.S. RESOLUTE, DEALY ISLAND.

*Game List, from 3rd September, 1852, to 9th September, 1853.*

| | | | |
|---|---|---|---|
| Musk-oxen | 114 | average weight | 166 lbs. |
| Reindeer | 95 | „ „ | 60 |
| Hares | 146 | „ „ | 8 |
| Bears | 6 | | |
| Wolves | 3 | | |
| Foxes | 51 | | |
| Ptarmigan | 711 | „ „ | 1 |
| Geese | 128 | „ „ | 2½ |
| Ducks | 229 | „ „ | 2½ |
| Plover | 16 | | |

*Issues.*

| | |
|---|---|
| Meat on board | 13·302 lbs. |
| „ travelling | 6·637 |
| Unfit for use | 2·406 |
| Small game | 5·138 |
| | 27·483 |

Captain Kellett remarks, "I have been most successful in procuring game, and that of some size,—musk-oxen and reindeer, which enabled me to serve 1½ lb. per man each day for some considerable time. This was not obtained without labour. My principal hunting grounds were distant from the ship twelve to fifteen miles. I have detached five hunting parties away at one time; besides every encouragement and facility was given to sportsmen to hunt the country in the neighbourhood of the ship." But, notwithstanding our Western parties passed over land where game abounded, their travelling duties and want of fuel to cook the meat procured, de-

barred them from the enjoyment of many fresh meals. To persons reduced to necessity there is every reason to believe that the means of sustaining a miserable existence might be found on the coasts of Cornwallis and Melville Islands; but it is fearful to contemplate the result; for most assuredly scurvy, in its most virulent form, would soon deprive them of the power to travel to a position where effectual aid might be available! But, granting that some more vigorous individuals might have been able to push forward, in the hope of sending back assistance, if encountered, we who have travelled and calculated the powers with sound men and good sledges, know full well that powers to drag the carcases killed would not avail them beyond short distances, and that the first journey would probably carry them beyond the grounds where game resort! It has been imagined, because game has been found in particular spots, that it must prevail throughout these regions, and moreover that on our particular ground it would yet be more abundant. The fallacy of such arguments is, I trust, now determined.

It was natural enough for the ice-bound crews of the 'Resolute' and 'Investigator' to eat, drink, and be merry; but with our missing friends, if existing, the ship, the home, and the fuel were wanting, to render the meal palatable. Independent however of food, I cannot now believe in the possibility of any party existing without some substantial shelter in a climate which averages over 151 days a mean temperature of $-30{\cdot}81°$, and at times as low as $-63°$! Again, on comparing our climates, Captain Kellett remarks:—"We have had during the

summer—June, July, and August—very mild weather; an unusual quantity of rain, but little wind.

"It rained in June on 5 days: 9 hours hard, 24 rain, 6 drizzle.
„ July 11 „ „ 33 „ 57 „
„ August 6 „ 6 „ 49 „

Now it is very strange, with so insignificant a difference in latitude, that I cannot call to mind any instance of positive rain. Had any such visitation occurred, our tents would inevitably have been frozen, and therefore I think I may safely assert that we had none. At our hottest period, when the heat within the tent was termed dreadful, the thermometer, in free air, on an elevated cliff, and suspended four feet above the earth, indicated 24°. Under such circumstances, any falling moisture would assume the character of snow. Indeed we did not experience any temperature which would afford a flow of water from the snow until late in June, at which period the floe traversed by Commander Richards, about a degree to the southward, was very sludgy. Rain would have set our valley courses and rivers in motion, but nothing of this nature met our notice during the season of 1853.

A very unfortunate accident occurred to Mr. Roche, the second to Lieutenant Hamilton, shortly after leaving the 'Resolute.' He was in the act of withdrawing his fowling-piece from the sledge, when it went off, passing the ball through the thick portion of the thigh, but without injury to the arteries. He was immediately taken back to the ship, and Mr. Court, Master of the 'Investigator,' took his place.

Fortunately, I found that arrangements had already been made for the movement of eighty-three officers and men of the 'Investigator' and 'Resolute,' so as to reach Beechey Island by the 1st of May. This Division will probably be in readiness to start by the time Commander Richards reaches the 'Resolute;' they will again be met by our entire Division of nine sledges, instructed to afford them every assistance, or, not being required, to push on supplies for Captain Collinson to Cape Cockburn.

It is with feelings of great satisfaction that Captain Kellett affords me the opportunity of publicly stating his opinion with regard to the second French officer who has so gallantly associated himself with this Expedition. Speaking of him, he observes:—"Monsieur de Bray leaves me with the goodwill and good wishes of all,—officers and men; he has done his service much credit, which I shall take an opportunity of stating in a separate letter."

With regard to the decease of Samuel Hood and James Wilkie, he observes:—"The deaths of these two men, no doubt, have been hastened by the severity of the climate and the trying nature of the labour in travelling they had to perform, acting on already diseased organs and shaken constitutions."

I understand that these two men served in the 'Investigator,' under Captain Bird; in this ship, under Captain Ommanney; and latterly in the 'Intrepid' (four winters). This strengthens my view—that every man who has volunteered afresh, from the last or former Expeditions, is materially injured in constitution, which

manifestly leads to the support of my principle: fresh blood for every department but the Commanders of vessels. The service itself injures the Profession; habits are indulged in which are not easily thrown aside; and the approximation to the freedom of the whaler is too close to prove pleasant to those who endeavour to maintain a service discipline.

"Those are not the boots they came down to ask *our opinion on*," very glibly oozed from the mouth of one of the Arctic seamen of last cruise.

My return despatches being complete, and a gale, which commenced on the arrival of Lieutenant Hamilton, abated, he quitted us, on his homeward route, on the 3rd of April, attended by a considerable rise of temperature and a fine cheering sun.

The completion of March furnishing a fair comparative range of the cold for this season, I have therefore thrown them into a tabular form, from which I have reason to infer that we have already enjoyed our minimum allowance of cold, as compared with previous voyagers. Some indeed there are who would contend that Arctic seasons are gradually becoming milder, but no such assertion is tenable under the evidence which we have been able to collect.

In a former place I alluded to ranges over the months October to June, both inclusive, as establishing very nearly a mean of $-10{\cdot}00°$, but within that period were many + signs. I have therefore on this season adopted the five coldest months, and classed them in the order of the different Expeditions, commencing with Sir Edward Parry at Winter Harbour, Melville Island.

# MEAN MONTHLY TEMPERATURES,

## NOVEMBER TO MARCH, INCLUSIVE.

| | Parry. Melville Island, 1819–20. | | | Parry. Port Bowen, 1823–4. | | | James Ross. Port Leopold, 1849–50. | | | Captain Austin. Griffith Island, 1850–51. | | | 'Assistance.' Northumberland Sound, 1852–3. | | | 'Assistance.' Wellington Channel, 1853–4. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Nov. | +6 | −47 | −20·60 | +17·0 | −26·0 | −4·99 | +16·0 | −37·5 | 14·50 | +13·0 | −31·0 | −7·50 | +21·0 | −28·0 | −5.53 | − 7·0 | −37·00 | 18·33 |
| Dec. | +6 | −43 | 21·79 | − 4·5 | − 3·5 | −19·05 | −14·0 | −56·5 | 36·40 | − 5·0 | −39·5 | 22·90 | − 6·0 | 46·3 | 32·31 | +12·0 | −46·50 | 28·08 |
| Jan. | −2 | −47 | 30·00 | 14·5 | 42·5 | 28·91 | 9·5 | 50·5 | 35·70 | 9·0 | 45·0 | 31·00 | −12·0 | −63·2 | 40·37 | +26·0 | −59·25 | 37·38 |
| Feb. | 17 | −50 | 32·90 | 8·0 | 45·0 | 27·32 | 17·0 | 60·0 | 35·20 | 11·5 | 46·0 | 32·50 | + 2·5 | −47·0 | 29·39 | −20·0 | −57·25 | 40·24 |
| Mar. | +6 | −40 | 18·10 | 9·0 | 47·5 | 28·37 | + 8·0 | 51·0 | 22·80 | 8·0 | 44·5 | 25·70 | +24·0 | −55·5 | 17·72 | −12·5 | 49·62 | 30·47 |
| Mean 5 Mo. | | | −24·48 | | | −21·73 | | | −28·92 | | | −23·92 | | | −25·06 | | | −30·90 |

These numbers, excluding Port Bowen, which appears to possess a temperature peculiar to itself, resulting probably from its being protected from easterly and open to westerly influences, afford pretty conclusive evidence that if any change is to be inferred, it must be taken for increased cold. And I am very much inclined to suspect, that if our temperatures for the late season had been registered on the land instead of the floe, that a trivial increase of cold, perhaps $-1{\cdot}5°$, might have resulted.

*April* 9.—I had fully anticipated a decided increase of temperature, indeed of *plus* signs, before this period; but appearances, as well as past experience, already teach us that cold is yet to prevail, and that we shall have to record the coldest season experienced possibly by human beings. The five-monthly mean of cold has been already given in the previous table, and nine days have elapsed, still exhibiting a temperature of $-11°$. On the 10th it reached $-1°$, and another attempt was made on the smooth floe ice to determine the question of freezing beneath: the thickness proved to be five feet six inches, and my former theory as to the under surface was in this instance completely verified. The ice had not only ceased *to form*, but the lower portion, of two inches in depth, was entirely composed of *loosely cohering separate crystals*, yielding easily to the pressure of the finger. The ice in contact with these crystals was also in what we should term a *rotten* state, in a disintegrating condition, and easily penetrated by a knife or piece of wood. I tried further experiments on the water itself at the bottom. This was effected by closing the neck of the

bottle by a plug of loose cotton: the lead (14 lbs.) being attached, carried it too rapidly to the bottom to admit of any ice entering. It is evident that the pressure below would force the cotton, and when the bottle became full the cotton would resume its position in the neck. By reference to page 178, Vol. I., it will be seen that similar experiments determined that the sea during winter is constantly charged with minute crystals of ice; this had now ceased; the water, on examination, was found to be perfectly transparent and free from any such crystals; moreover the temperature, during its very short passage from the floe to my cabin, had risen to 36°. These facts satisfy my mind that from this date we may safely calculate on the water penetrating, and, acting on any fissures which may offer, aiding in the destruction of the heavy pack.

An occurrence at this moment forcibly impressed on our minds the effect resulting from any sudden shock communicated to the ice, and the result on the ship. It was found necessary to enlarge the fire-hole alongside the ship; and to aid in effecting this, the Boatswain employed one of the heavy loggerheats (oblong shot) supplied for breaking the light bay ice (its weight was two hundredweight). This was allowed to fall from a height of about thirty feet, the ice on which he was acting being four feet in thickness, but previously cut free on three sides by the ice saw.

The concussion to the ship at the stern, where I was seated, sixty feet distant, was fully equal to 20 lbs. of gunpowder, and caused everything on the table to vibrate. Nor could I be brought to believe for some

minutes that it did not proceed from a blast under the counter. Similar in their effects are the sudden fissures, in the early season, of young ice, which, conveyed by the ice to the ship, produce those sounds so frequently mistaken for breaking of bolts, timbers, etc., none of which have been noticed since January.

*April* 14.—This morning we experienced the very uncommon visitation of a westerly wind, succeeded however by one strong from the southward, which will, I trust, on this spring tide, afford us some indication of the break of winter, which has indeed been one of unusual gloominess as well as severity. Last season all were inspirited by the extraordinary excitement caused by the preparation for search; but now all before us is charged with the labour and anxiety of extricating our vessels, terminable perhaps by cramming all the survivors into one ship. At noon the temperature attained +3°; so far satisfactory, as complying with expected change.

Two sods of peat were brought in today as belonging to some newly discovered cairn; but such matters were now too well known to me to cause a moment's doubt. I knew them to belong to the spot from whence our tree had been dug, and further examination proved I was correct. My reason for noticing this at present is, that had I not despatched a party to report further on this matter, doubtless it might have been magnified into sufficient importance "to regret that more intimate search had not been made," or possibly to be the foundation of a mad-brained volunteer after the spot had been quitted. The operators in the former instance reported the work as their own. I seldom baulk a man in his hobby, and

find it much easier to grant him leave to take exercise in his pursuit and convince himself, than expend reasons, which seldom convince.

But to return to our pieces of peat, for they really solved a matter which as yet to me was an enigma. During a close examination of this peat, after thawing in my cabin, I found it to be composed, to a depth of nine inches, almost entirely of the remains of lemmings. The grass on its upper surface exhibited signs of advanced vegetation, assuming a light green hue, and about the roots I detected a minute glossy maggot in full activity, brought into existence perhaps by the temperature of my cabin (52°). This proof of the progress of vegetation beneath the snow may possibly prove interesting to naturalists. The maggot having been placed in a tin-box with some of the grass tufts, in which I felt as much interest as some would about flowers, shortly after assumed the state of a black chrysalis, identical I believe with those noticed on Grave Mount, the derivation of which was now sufficiently explained.

The history of the lemming is of itself, even in Northern Asia, one of great interest, and the allusion to the "armies" of these field-mice must be extended even to these regions, for nothing short of such myriads could have produced beds of exuviæ nine inches in thickness. They are still numerous here; but as their forays, even in warmer climes, do not occur for intervals of many years, they may yet exist on the southern shores, and await for a marvellous summer for their marvellous marches! We have noticed their tracks far out of sight of land; upon what they live we cannot determine, but

that they are the prey of numerous birds and animals we well know.

On the 17th I forwarded a shooting party, with a week's provision, to the north-east; it was placed under the direction of Dr. Lyall, and partly composed of some of our men who have been particularly subject to affection of the gums, induced principally by their peculiar duties and confinement on board. They started about ten A.M., with a temperature of 7°, in high spirits, and passed round Cape Eden, taking the direction of the great Eastern Valley, falling in suddenly from thence. Today also, for the first time for some weeks, I made an attempt to bask in the sun's rays on the upper deck, enjoying a temperature of 14°.

*April* 20.—My visits on deck perhaps rendered me more expectant, but I could not shake off the impression of something advancing. Today I had become wearied, and had not yet reached the deck, when I was apprised of some extraordinary event by the noise on deck, and, before I had time to make inquiry, the arrival of Commander M'Clintock, with the dog-sledge, was announced. He was the bearer of letters from Captain Kellett, the contents of which certainly surprised me, as I conceived that my letters, independent of the explanations which Commander Richards, as well as Lieutenant Hamilton, could give, left no doubt as to my intentions; indeed Commander Richards had, for this special purpose, been sent instead of Commander Pullen. The question at issue appearing to be, that, as no *imperative* orders had been sent, he would await them, I penned the following:—

*H.M.S. Assistance, Wellington Channel,*
*April* 21, 1854.

SIR,

I have to acknowledge the receipt of your communications of 12th April, which, with others, will be formally noticed on my arrival at Beechey Island.

Having maturely considered the contents, I see no reason for altering my original decision in October last,—that the 'Resolute' or tender should be abandoned, or both.

The only consideration now arises from the absence of travelling parties. You are therefore hereby directed to withdraw from the 'Resolute,' the valuable stores, chronometers and instruments, officers and crew, and repair for further instructions to Beechey Island, leaving Commander M'Clintock to await the return of the absent sledge crews, when he will also abandon that vessel* and repair to Beechey Island.

It is almost needless for me to add that both vessels are to be well battened down and nothing disturbed, so that they may be *re-occupied, should I deem it necessary*, in July or August next; or that their extrication, should Nature send them to us, off Beechey Island, will be a simple matter of re-occupation in a fit condition for immediate service.

The sledge crews devoted to this service by my last "General Order" cannot now be spared from the duties required here, and must reach this ship by the 15th of May, but those of 'North Star' and 'Investigator' will be placed at your disposal.

Given under my hand on board H.M.S. Assistance, in Wellington Channel, this 21st day of April, 1854,

EDWARD BELCHER, *Captain,*
*Commanding the Arctic Squadron.*

CAPTAIN H. KELLETT, C.B.,
*H.M.S. Resolute, Barrow's Strait.*

But these definitive, imperative orders, were not, as may be imagined, the result of arbitrary command; and it is necessary to a just view of the case, to give the following letter, delivered by Commander M'Clintock; it bears date the 12th of April, 1854:—

* 'Intrepid' tender.

"My dear Sir Edward,—Nothing is further from my intention, in the letters I have addressed to you, than that of irritating you, but you really have given me no orders that I could act on. Had you said to me, That, knowing their Lordships' views, and weighing my altered position from that you expected me to occupy at the time of your writing my orders, it was your direction that I should abandon (my ship) both vessels, all would have been well with me, and you would have had *me* with you."

And yet Lieutenant Hamilton, *after I did know all*, was the bearer of my letter, containing the following:—

"You will, on your arrival at the 'North Star,' with all the others, be borne as supernumeraries for victuals, etc., but in command. You will treat Pullen as a Commissioner of a Dockyard, and let everything be conducted on paper. Give your orders, hoist your pendant on any boat, and command.

"You have before you all that I know. You know the late orders of the 'Phœnix,' if she got home; and nothing but *decision, at my risk*, must mark the movements of this Squadron.

"The next orders will be imperative; and, after their receipt, there will not, probably, be any opportunity for any ulterior measures, at that late season, for withdrawing crews and reaching Beechey Island.

"This *abandonment* goes mightily against the grain. If we could save even 'Intrepid,' it would be something; but your *distance off-shore* precludes any movement before the 22nd of August, and that is too late for operations at Beechey Island. *No! all must come;* no vo-

lunteering will satisfy me! If new crews are sent from England to hold 'North Star,' then a party could proceed back to extricate one or both. Strike topmasts, and get everything on deck.

"If you had not been so pinched, I think you would have derived some satisfaction by following up the *possible* tracks of Collinson by Cape Walker, Cape Batty, and Port Leopold, and even of conducting him to 'North Star;' I am not without hope that Pullen will."

But let us proceed with the further matter, for it is entirely public, contained in Captain Kellett's letter.

"M'Clintock is a sound and safe man, who will give you any information that I omitted. Are your vessels safe to get out? Even mine in a harbour or on shore, hauled up, would be well; but they are not, and must be sacrificed."

With Commander M'Clintock I fully discussed the matter for *two days* before those definitive Instructions were delivered to him, so that it can hardly be imagined that the case was not thoroughly sifted in all its bearings; indeed Captain Kellett had my further confidential arguments upon the measure by a demi-official of the same date: thus,—

"My actions, my good friend, must stand the public test in England, and he is a *weak Commander* who gives reasons for his conduct before they are demanded by authority.

"All my letters will probably be demanded, and they must all accord in the same determination, understood fully by the two late First Lords, to whom I must leave any defence that may be demanded. I will not deceive

them, nor shall their replies or assurances deceive the country that the trust reposed in me, viz. 'the final issue of all Expeditions to this region, for the end intended, should rest on my decision.'

"The valuable time for action, *i. e.* for the withdrawal of valuables, has elapsed. My sledges must return here before the 15th of May; for we have infinitely more to do than you have, and the water will impede me before it can you.

"If it should be the pleasure of the Admiralty that the ship should be saved, that intention will be completely met at Beechey Island, and at that date the sea will be open, and reduced crews and new men can be sent before the ice breaks out on the 22nd of August (and not before) in Barrow's Strait. Our vessels must, under any circumstances, be left to chance,—to the workings of Nature,—we cannot help them; and the value of one man's life, in my view, is far above what the hulks will sell for as firewood. Independent of this, double wages, left in danger, the expenses of other ships sent out to search for you, would entail something more, I imagine, than the value of stores abandoned!"

Such then being my feelings, I took leave of Commander M'Clintock, who quitted about nine P.M. on the 21st. But it must not be imagined that the mere question of the safety of the 'Resolute' and tender occupied my thoughts. Every man fancies *his* goods and chattels of the most importance; but let us calmly look to my duties. If *all* could not be saved, then those measures should be adopted which *promised success*. No chance, *to my conviction*, offered of carrying out the *double duty*

of *adequately* provisioning the 'Resolute' for the requisite period, without the united exertions of the *whole force* at my command, and then merely on a *chance* of *success!*

But as regards this ship, everything was in favour of *her release* and of saving her most valuable stores. Further, if it should be the will of the Admiralty, sufficient provision could be forwarded to this position, only fifty-two miles from Beechey Island, to admit of a crew staying by the ship until it became prudent to retire for the winter to Beechey Island. In such a case very few men would be required, and those only to live in the tender. My duty therefore, and on *my shoulders alone* would rest all the responsibility, *however advised,* was clearly to save all the stores and valuables that could be conveyed to Beechey Island before travelling became dangerous *or impracticable,* so that the force at the last moment should direct all their energy to extricate the ship.

My readers may imagine that all the summer months are available for *travel,* but they may be sadly in error. As the heat increases the floe becomes so covered with water, even if not disrupted and exhibiting impassable gaps or loose pack, that it is dangerous to attempt travelling *without stores,* and this occurs at the very moment that decision as to the *dernier ressort* is demanded.

The circumstances in themselves left no sensible alternative, for the 'Resolute' and tender were beyond a reasonable distance, or 180 travelling miles *west* of Beechey Island, the post at which we do not anticipate open water before the 22nd of August: and at that moment the sudden arrival of a steamer, with as sudden orders to abandon, and such orders given under the full conviction

that I was *worthy of the trust reposed in me:* certainly those who selected me never contemplated my shifting any responsibility on those whose *opinions* I might ask, but which expressly, by my Instructions, I was only to follow—"*If such likewise should be your opinion.*" Again, "We place every confidence in your zeal and intelligence, that you will act with sound judgment in whatever situation you may be placed."

Now the degree in which my character for judgment and discretion was to be involved was within my own keeping, and no one but myself positively knew the full intent of every word of my Instructions. If I failed, after the extracts I have given of my confidential explanation, to induce others to coincide in the view I took of the public interests entrusted to my charge, it then became a prudent duty on my part to continue the service without risking further difference of opinion, or of estranging those who still, if I could credit written evidence, professed the most friendly and, as I believed, professional anxiety to further all my views.

Shortly after the departure of Commander M'Clintock our sporting party returned, having killed two hares; they had not noticed the most remote trace of musk-oxen or reindeer—possibly from not having penetrated sufficiently into the country, or from the period of the season being too early for their emergence from their winter concealment. Several of the party seemed to have experienced attacks of snow-blindness, and to be generally rather fatigued by the excursion; but, on the whole, I can detect that it has been beneficial, suffusing the olive complexions of some who have not seen much

daylight or been exposed to the open air for the last six months with a more natural tint of carnation.

*April* 23.—The weather has evidently taken a favourable change; the temperature is now at 12·5°, snow thawing on the dark portions of the land, the ship's sides, and awnings directly exposed to the sun's rays, but within the awnings on our quarter-deck the temperature showing 21°; the drippings remind one strongly of some limestone cave, where the icicle and the deposit on the deck represent the stalactite and stalagmite. The temperatures for the last ten days have gained the *plus* sign, affording as follows: maximum +16°; minimum −18·25°; mean +17·14°. Notwithstanding the low temperature, even in my very weak condition, I really can pronounce the air, under the full influence of a bright sun and cloudless sky, to be balmy and delicious.

Trifles, at any other period to be classed light as air, here assume an importance intensely interesting. Doubtless most of us have experienced the delight, as boys, in rearing mustard and cress; but a proficiency in every employment does not fall to the lot of every experimenter; and so we find even the rearing of mustard and cress in close cabins, and without daylight, is a subject for competition; here, however, it becomes a matter of vital importance. The experiments to which I now allude were conducted in my cabin, in three boxes filled with the sifted dust from pounded peat: No. 1 was simply the peat; No. 2 the same covered with a fine filmy sheet of cotton wool; No. 3 the same, but with a sheet of "wadding." Today that in No. 3 had reached a length of five inches, close, strong in stem, and of a light green, which

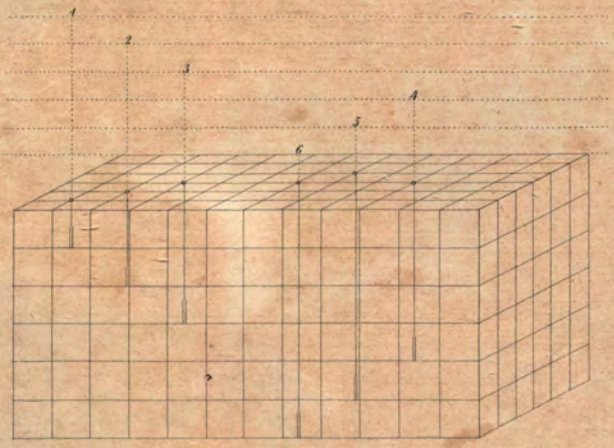
## THERMOMETERS imbedded in Snow in Winters of 1852-3, 1853-4.

*Between Oct^r/52 and April/53*

*247 taken up in confusion*

*263 Register useless —*

*all inserted at Zero*




*Between Dec^r/53 and May/54*

| | | | | |
|---|---|---|---|---|
| 262 | withdrawn | 20 | and | 0 |
| 253 | — . — | 35.5 | — | 19 |
| 247 | — . — | 14.0 | — | 44 |
| 244 | — . — | 11.0 | — | 13 |
| 242 | — . — | 9.0 | — | 26 |
| 248 | — . — | 22 | — | 15 |

Printed by Vincent Brooks.

Thermometer Block.

has been improved in colour lately by exposure to a very faint ray of light down the companion skylight. The interval in which this fine crop has been produced is 168 hours. I find, from my notes, the following:—"The light in forty-eight hours produced a vivid green instead of a sickly pea-green." The amount raised in the holds alongside the Sylvester furnace, under a temperature of 54°, has reached eight pounds, and has been distributed principally to those of scorbutic diathesis.

*May* 1.—On this day I had hoped to start for Beechey Island, but that event now appears to be postponed for some time, or at least until the season permits of floating the ship, an operation demanding more than the present force of our debilitated and absent crew will afford. The temperature last night fell as low as —15°, but the means of the concluding days of April afford as under:—

April 28, max. +21°; min. +15°; mean, 17·875°.
April 29, „ +23°; „ +16°; „ 19·666°.
April 30, „ +20°; „ —3°; „ 9·500°.

The monthly result affords:—

Max. +23·00°; min. —37·50°; mean, —5·197°;

the mean for the corresponding term last year being —8·127°. The thermometers buried in the snow-bank, although most critically and carefully managed by Mr. Loney, do not appear to be trustworthy as instruments for reliable results; still they afford certain proof of the warmer temperature of the snow, as may be seen from the annexed Plate. The thermometer inserted in the wooden tube at four feet below the earth's surface coincides nearly with No. 6 in the snow. The indices, when

exposed to temperatures below —20° in the air, do not act satisfactorily; indeed I can only repeat here my entire want of confidence in any Six's thermometer which has passed through my hands on this service.

As the term approaches for the return of our relief sledges, our trusty Sergeant of Marines and a selected companion were despatched, with orders to encamp on the brow of a commanding hill about three miles to the southward, to watch for and signalize any approach of sledges, as well as to scour the heights southerly for game. Today they were visited by some of our excursionists, who brought back one hare, which was allotted to the sick. It is strange how some men will recoil at being termed invalids, or even subjects for attention; instead of any gratitude for the addition, they preferred the preserved meats. Such is human nature!

On the morning of the 3rd the signal from the Sergeant's station announced the sight of sledges advancing, and about eleven A.M. the 'Sir Edward' and 'Success' sledges, with Commander Richards and Mr. Herbert, returned, bringing intelligence of the arrival of Commander M'Clure and his crew (excepting one invalid, to follow with the 'Resolute's') at Beechey Island.

*May* 4.—This, being our ten-day interval, exhibits but little advance in the mean temperature; maximum +23°, minimum —16·5°, mean —4·798°.

The water beneath the ice, although it still maintains the standard of 29·5°, nevertheless exhibits decided thawing influence wherever it can find its way up, percolating the solid floe and thawing the partial joints formed by the overlapping of "the run" of October last.

This sponginess of the ice is clearly manifested by the rising of the water where we commenced a cutting over our anchor, as well as at a crack near the sternpost, where the ebb and flow of tide is clearly indicated, notwithstanding temperatures as low as —19°.

Yesterday two holes were driven horizontally into the snow-bank near the ship; one at the denuded floe edge, the other three feet above and immediately over; into these holes two spirit minimum thermometers were carefully inserted, and the holes well closed with snow. The temperatures were raised to 32° before insertion, and that night the external register indicated —12·5°. At first sight these experiments may be supposed to be simply connected with meteorology; but my object had further reference—disregarding empirical assertion—to the most advantageous position for pitching tents, on ice, snow, or gravel. I have, upon my own impression, as before observed, preferred snow, and the Esquimaux do not, I believe, clear it off *to* the ground when they construct their snow-houses; I find it, moreover, pleasanter to projecting bones than irregular ice or gravel.

*May* 6.—Today we commenced lining out the cuttings for our dock to lead the ship ahead and off-shore, before we lose the substantial floating power of the ice should the depth prove scant; for it is evident to my senses, that whilst thus cradled and uplifted it would prove a very easy matter to transport the entire floating mass to seaward, when the weight of the ship freed from ice might defy our exertions.

On the evening of the 7th our first sledge of the mail line, intended to be maintained, conveying instruments,

etc. to Beechey Island, departed. I had fully contemplated the necessity of some such proceeding before quitting England, and the propriety of establishing resting-places or houses of call, should necessity reduce us to the abandonment of the vessels. This I now determined to carry out, establishing four journey positions in the fifty-two intervening miles, where tents, and all the necessaries for cooking, sleeping, etc., would be provided, and thus relieve each sledge of that weight, amounting, as under, to 335 lbs.

| | |
|---|---|
| Tent and gear for ditto . . . . . | 62 lbs. |
| Sleeping bags . . . . . | 74 |
| Buffalo robe and cover . . . . . | 73 |
| Waterproof and canvas bottoms . . . | 48 |
| Cooking apparatus . . . . . | 32 |
| Axe, pick, spade, boat-hook . . . . | 26 |
| Boarding pikes . . . . . | 20 |
| | 335 |

This arrangement ensures the dry tent, ready pitched with due preparation on arrival, by the party in possession, and further, relief from the trouble of packing on resuming the march. The stations at present contemplated are Cape Osborn, Cape Grinnell, Cape Bowden, or Baring Rendezvous (commanded by Sergeant Jefferies), and Cape Spencer.

The consumption of fuel, and other reasons, rendered it expedient to withdraw all the tent-keepers but the Sergeant and his assistant at Baring Rendezvous, where a supply of provisions would be accumulated to aid the travellers, as well as meet any emergency, should a sudden disruption of the ice or other event compel the crew to seek refuge at Beechey Island.

## CHAPTER VI.

Lifting of the Ship.—Lateral Compression.—Freezing in Bottles.—Snow Thermometers.—Rise and Fall of Water.—Blasting.—Flight of Birds.—Letter to Captain Kellett.—Proceedings of Lieutenant Mecham.—Captain Collinson's Records.—Dealy Island.—Beechey Island.—Proceedings of Lieutenant Hamilton.—Irregularity of Tides.—Land Springs.—Remuneration of Crews.—Orders.

My attention during the last few days has been much engaged outside of the ship; indeed, superintending the duties on the dock cutting; and I cannot but observe that the peculiar lifting of the ship, added to the gaping of the ice at the old floe level, induces me to offer the following facts and reasons, which I leave to those whom it may concern to combat.

In October last I contemplated this lifting, and, as then noticed, directed a gauge batten to be securely nailed to the sternpost, so as to indicate any upheaving. I now notice that this batten indicates a rise, or lift of the ship, fourteen inches above the floe level of that period.

Upon mature reflection, and viewing the undoubted strain evident at the last third of her length, or the stern portion, I am inclined to consider that up to midwinter or beyond, as the ice gradually consolidated, its expan-

sive force was exerted on the opposite sides of the segments of our cradle dock, which, as it formed under the counter, presented a nearer approach to the wedge influence, and thus imperceptibly tended to lift the vessel. If the fluid water would effect this, surely it will not be contended that solid ice could not.

This wedge power, having no yielding surfaces laterally, I assume to be one, if not the grand, cause of the heavy cracks, or reports, before alluded to, and termed "cracking of bolts," and which ceased entirely about January, as before stated.

Now, reverting to the action of freezing on different fluids in slight glass cylindrical jars, they would, if confined at the orifice, under common reasoning, be broken at the moment of complete congelation, by the sudden expansion. But my experience teaches me that this is not a law, and that under the course of freezing, we have first, the coating of fine crystals on the outer exposed surfaces; next, the accumulation of the floating separate crystals into a sludgy, creamy snow or ice; and finally, consolidation and expansion. This latter is an enormous power; but its action, I find, depends very much on the vessel in which it is contained. I never, freezing at temperatures at $-51°$, found it break or crack any glass vessel; but I noticed that where it froze in the long tube (nine inches by five-eighths bore), it elongated the ice, and forced it vertically out of the tube to the extent required by Nature. In bottled fluids, which being corked offered resistance, I found they were burst at the shoulder near the neck when of the wine-bottle form; but where beer or ale was exposed in champagne-

bottles, affording no abrupt opposition, that the ice first forming in the long narrow neck simply displaced the cork, and forcing the icy cone into the neck, saved the fluid by Nature's own cork!

In the case of the formation of the floe, careful experiment teaches us that the daily rate of freezing does not exceed 0·45 inch per diem: that the lower stratum of ice is, so to speak, rotten until it assumes an accumulated thickness of eight or ten inches; then it becomes homogeneous with the upper floe ice; and if it does not buckle and break by lateral pressure, its expansive force is likely to act on the ship and gradually lift her, until she becomes eventually perfectly imbedded and secured from further pressure by the great solidity of the ice itself. This motion *upwards* appears to be indicated by the surface line of cradling *gaping* at the presumed water-line, just in such a degree as would naturally be noticed in replacing any vessel sitting in a mould of wax, where some extraneous matter prevented it from falling into its proper position. Another curious fact has just been determined, viz. that at the stern, where but twelve feet water could be found in October last, we have now sixteen feet: consequently the ship cannot be aground. This is matter beyond my comprehension, without calling in the aid of the same expansion acting between the position occupied by the ship and the land.

*May* 13.—Yesterday three sledges, commanded by Lieutenant May, Messrs. Grove and Pim, Mates, returned, but brought no news of importance from Beechey Island. The tent depôts already alluded to on this route were established.

At noon today the thermometers placed in the snow-bank on the 3rd were withdrawn: that at the floe surface in contact with the ice indicated $+14°$; the other, having three feet snow beneath and one foot above, $= +2°$: both rose immediately 2°. The external thermometer was 18° at the same moment. These thermometers therefore represent the minima gauges; the external indicating, during this ten-day interval, on the three consecutive days, the low temperatures of $-19°$, $-15°$, $-10°$; the ice therefore, protected by a covering of snow three feet in depth, was warmer by $-19° + 14° = 33°$; and one foot, probably the thickness of a rapidly constructed snow-house, would afford by this experiment $+19° + 2°$, or 21° warmer than the external air, and free from the searching power of the breeze, which, after all, is the most important consideration in such calculations. The thermometers were of deep tints of ruby when first embarked; but long exposure to light had so much affected one, that it now presented a pale amber hue. These were now exposed on a brown spar, to test the sun's direct rays: the amber rose to 17°, the ruby to 18°. Further exposure on the black sides of the ship afforded amber 40°,.ruby 42°. They were then at this mark replaced in the snow.

*May* 14.—Our temperatures during the last ten days afford max. $+18°$, min. $-19°$, mean $+2{\cdot}529°$; not much warmth to boast of. Having noticed several indications of more determined tidal influence, experiments were tried today by inserting a tide-pole through the fire-hole (a hole about six feet square, abreast the gangway, kept open for obtaining salt water in case of fire). This in-

dicated no less than twenty-one feet eight inches amidships. The tide fell one foot within the hour; fully proving, as the ship fell with it, that she is ice- as well as water-borne.

This remark requires further comment. The rise and fall of tide is apparent, not only on the tide-pole, but also on the ice; proving that until the floe becomes entirely free from the shore, it does not rise and fall to the *extent* to which the water indicates it *should*. Thus, in addition to the rise and fall as exhibited by the true index (the tide gauge secured to the bottom), we notice a rise and fall between shelf cakes of ice deposited at high and low water, a distance of eighteen inches, fully proving a resistance in rising due to floatation if free. This is specially evident at the in-shore cracks, where the communication is impeded at high water by thin sludgy ice and water. Although the ice immediately about the after parts of the ship does not gauge above seven feet in thickness, we find that it increases rapidly towards the bows, being fourteen feet at the stem and twenty-four feet at twelve feet ahead. The water now begins to incommode our labourers at the dock, flowing up by every crevice of the disjointed pack. The crew have been transferred to the 'Pioneer,' in order to purify and paint the ship between decks.

*May* 15.—The accumulation of medical officers and invalids at Beechey Island rendering it prudent to place the senior medical officer there, I despatched Dr. Lyall by the mail sledge (Lieutenant May) today, with the necessary powers to take charge of the hospital, returning Mr. Ricards to do duty here.

*May* 22.—The 'Enterprise' (Lieutenant Cheyne) returned on the 17th: no news of Captain Kellett's arrival. Prayers were read yesterday on board the 'Pioneer;' the weather still cold and raw. Wolf hovering, but infinitely too cunning for our most expert sportsmen. This evening Mr. Taylor (the Boatswain) and my Coxswain returned from an excursion, having met with Mr. Herbert at Cape Grinnell, and brought on the letters. One ptarmigan had been shot by the Sergeant. They saw a large bear, but he proved equally cunning as the wolf, having dodged them, as well as the dogs, amongst the hummocks on the coast-line. Punch, however, never behind in enduring energy, seems to have remained behind alone, watching the enemy, returning late and very much fatigued: half crippled, and all his best teeth useless, his courage is astonishing!

Late this evening Mr. Herbert reached; the intelligence brought by him is unfortunate. Lieutenant Pim, who had superseded Lieutenant Cheyne at the depôt at Cape Hotham, and appointed to watch the final sledge parties from the 'Resolute,' had shattered his hand by the bursting of his fowling-piece when firing at a bear. Fortunately Dr. Domville, in charge of a sick man, travelling full speed with the dogs, arrived in time to render assistance; he had reached the 'North Star,' and the wound was merely flesh, not immediately serious. What influence has the climate of this cruise in destroying so many fowling-pieces?

The seaman mentioned by Captain Kellett as not expected to survive had, by the aid of dogs and the great care of Dr. Domville, reached the 'North Star' alive; but

the report of the medical officers afforded no hope of recovery, even if he lived many hours.

*May* 24.—Her Majesty's birthday was kept by the sole means I had at command, viz. increase of rations; for the rest, our loyalty is not a whit the less, and must support us unsuspected.

The second interval of ten days on the thermometers buried in snow affords similar proof of the protecting power it affords; in this case—

1 foot beneath = + 8°; min. −11° + 8° =19°; max. +28·5°.
3 feet „ = +16°; min. −11° +16° =27°.

The general temperature improves on the ten days,—max. +28·50°; min. −11·00°; mean, +11·194?.

Our first attempts with powder to remove the upper ice in the dock were tried today; the results precisely what I anticipated. The holes were nine feet in depth, vertical, and the charges 12 lbs. They failed to force the bottom downwards, as some had contemplated, although they were tamped with close sludge and long fuse for seven feet. The cracks, owing to present pressure, will instantly reunite; the only rational mode is by digging down, and driving horizontal or oblique holes. I then tried charges of 20 lbs. each, passed *through* nine feet ice, without any proportionate disturbance of ship or ice; but on passing through the ice in seventeen feet, and resting the charge on the *bottom*, the ship received a very severe shock from stem to stern, extending even to one hundred yards between the ship and 'Pioneer,' but the ice was not started upwards satisfactorily! This result forcibly reminded me of particular occasions between the 30th of August and 4th of September last,

when the charges for important purposes were placed between layers of ice, affording the *point d'appui;* the action on those occasions only seemed to warrant such heavy expenditure. Water is easily displaced by air; and from a depth of twenty-one feet, where there was no solid matter to resist, it was thrown well above our mastheads without beneficial displacement of the floe. Its result in critical positions, and placed with judgment, I have before noticed.

*May* 28.—Our day of rest. I cannot yet see much beneficial effect resulting from the free use of gunpowder. The heavy floe has not yielded in any sensible masses; indeed, my own conviction is adverse,—that it hinders more important cuttings with the saw. Our work is confined to heavy quarrying and clearing out the loose pieces resulting from small *two* or *four* pound charges.

*June* 1 is ushered in with sleety, snowy weather, and a temperature of 40·5°, without sun. A dog-sledge, with Mr. Dean, Carpenter, of the 'Resolute,' and one man, reached, bringing intelligence of the arrival of Captain Kellett at Beechey Island, but suffering from illness. This journey was effected with seven dogs in twenty-four hours.

*June* 3.—I shall continue our report of blasting operations because I feel satisfied that the results may afford information even to those engaged in more stubborn materials, and possibly may be useful in ice-bound harbours, as affording some test of the available powers of man, if judiciously directed.

Our saw cuts had at length been completed on three

sides of a square, affording a surface of forty feet in width by thirty ahead, or twelve hundred square feet; mean depth, twenty-one feet. I contended against heavy charges, and in this instance prepared three of 10 and three of 4 lbs. The first ten-pound charge, placed near the bottom, at the cut in eighteen feet next the bow, effectually displaced this entire mass, and two, of four pounds each, effectually brought up the bow cradling. I have of late calculated minutely the working powers of the men engaged.* The result proves that, with numbers varying from ten to sixteen, and not of full power, they have broken up and thrown to the dock wall, from whence others remove it, six hundred tons of ice (by shovels and picks), affording a mean rate of one ton per hour for each man during the working intervals. Some of our strong hands have indeed far exceeded, I might say, even doubled, this; but the mean labour amounts to that which I have stated. During this labour, which, in cold climates, induces great thirst, I at first ordered an issue of lemonade; but this was found to disagree with their constitutions, and variations from time to time were made, in consultation with the medical officer, until it at length reached pretty strong brandy punch. This not only improved their spirits and working condition, but materially conduced to their general health.

The assembled crews here and at Beechey Island having, by special order, been surveyed by the surgeons and reported on in three classes,—fit for any duty, fit for light duty, and unfit for any exposure,—drafts were for-

* These result from the masses of ice removed in six days of ten working hours.

warded hither from the first class, and our weakly men, who might be unable to move on any sudden emergency, together with a change for every man in the ship, forwarded to Beechey Island. We were thus prepared to devote the combined energies of the Squadron to extricate these vessels, nor did I dream of eventual failure.

*June* 3.—Ten-day temperatures afford, max. +40·50°; min. −9·00°; mean, +24·26°.

About the 9th of June, birds, principally brent-geese, eider-duck, and gulls, began to make their appearance on their northern flight, and three ptarmigan and one hare were forwarded by the Sergeant from Baring Rendezvous. The 'Pioneer's' screw having been reported as in danger, the necessary measures were adopted to release it from ice, when it was found to be uninjured. We were now advancing steadily with our dock, and commenced reeving our heavy purchases to start the ship. Direct force I doubted, and, to aid in effecting my object, laid out a second at right angles on the port bow. The Small Bower (Rodgers'), on heaving a good strain, came home clear, underneath the ice, and eventually reached our bows again; both cable and anchor were well polished. The Best Bower cable was still frozen in with the floe, and, until the ship was free, that could not be recovered, for in blasting and cutting over it they had broken the buoy rope.

At noon of the 13th a dog-sledge was reported, and I went out to receive the visitor, which proved to be Monsieur De Bray. My salutation was, "Well, you bring me news of Collinson's safety?" "Yes, Sir, he is safe! and I have documents here for you," pointing to

his knapsack; of which presently. The ten-day interval of this, the 13th of June, affords,—max. 33·5°; min. 15·00°; mean, 24·154°: still unnaturally cold for this season.

On the 15th Monsieur De Bray returned to Beechey Island, and on the day following the 'Dove' whaler, on a new sledge constructed for her, followed. Another boat will be forwarded to Baring Rendezvous, and the 'Hamilton' and my own gig, to bear my pendant, will eventually go to Beechey Island. Before proceeding to the report of the proceedings of the western search by Lieutenant Mecham and Mr. Krabbé, I will place the ship afloat, and briefly observe on the difficulties attending such labours, where excavation to such an extent had to be pursued.

On the 16th the purchase ahead was tried, but it straightened the flukes of the ice and stream anchors, and displaced the pin of the purchase-block, splitting it to pieces! The effort proposed was to tear the ship from her starboard adhesion to the ice, the saw cuts being free along the entire port side and one on the starboard (*which froze as cut*). A heavy purchase from the mast-head, to induce a heel on this *crank ship*, was also brought in aid, but without success. Verily this ice work is a puzzling bit of engineering, and demands more thought to meet its caprices than any other operation in which I have been engaged. Under water we cannot *see*, but we know that we have more depth to float her than we require. By the powers applied, under ordinary presumptions, she should move ahead or yield to the force applied to incline her from the upright position.

Further measures, for powers *little short of dangerous*, were prepared, and on the morning of the 9th I had made my mind up for a result before I retired to rest. Before six we had succeeded, by saws and by using a seventy-two feet hand-mast as a vertical battering ram, in dislodging the ice along the port side up to the bend of the counter; powder was also used to an alarming extent, as far as crockery and pier-glasses were concerned.

The matter now resolved itself into one of power by purchases. We had built a new purchase-block capable of resistance. The direct ahead purchase was composed of two threefold and one leading block, or three by four, brought to Phillips's capstan with the full power, and double runner luff on the standing parts. Yet she moved not; *and the falls would bear no more.* My rectangular purchase of similar power, direct through the bow port, and secured to the grounded ice by iron necklaces, was now brought into action; this was also led to the capstan, and when well taut I paused, shifting my position to the starboard cathead, and there watching the effect on the parallel saw cuts along that side. In all such operations the principal actor is in a degree on the stage; he calculates that he is intently watched by every eye, and he knows when to be silent, when to order, and when to cheer, or ask for that power which none but excited hearts can afford.

I saw the influence; I saw she moved. "Silence!" "Heave taut!" "Off she goes!" One rallying cheer, and with such an impetus did she leap out of her cradle, that in her headlong career she tore out the slip ring-bolt of

the best bower cable drawing from *abaft the cathead.* To describe what my feelings were I will not undertake. The ship was again afloat on her own element, and my cares for a time were superseded by the ordinary course of service.

Having thus far explained myself, I cannot but thank officers as well as men for their exertions in their several stations. True it is that, invalid as I am, I worked possibly beyond what a Captain ought in other cases; but I had my object to fulfil, and notwithstanding some of the hardiest failed, excitement compelled me to stick to my post. To Commander Richards, Mr. Loney, Mr. Allard, Mr. Nares, the Boatswain, Mates, and crew, I feel that great praise is due. But for the entire *modus operandi* I am responsible, and I again repeat my regret that after the initial proceedings and finding water at the bow, I was persuaded to have recourse to gunpowder; but when once used there is no limit. Concussion and radiating cracks have been made; eventually these caused very disheartening slips of the dock sides, entailing double labour.

Physicians prescribe, but not unfrequently swerve from their practice by some persuasion that it may do the patient *no harm;* not immediate, it is true, but when it eventuates he thinks not the less of the result.

On the other hand, gunpowder has its importance. A *coup* is to be made, an effect produced on your sub-agents; then, having satisfied yourself that it will cause the desired effect, much as it may upset some of your petted schemes, yield to caprice, make a noise, shiver the mountain of ice, and seek for the moment of making

the most of the wills which the spectacle has arrayed in your favour, or possibly softened the under-current which has steadily, though unseen, been working against you. Of such materials are British seamen composed. He who knows how to lead, how to humour them, what can he not execute?

In order fully to comprehend my feelings at this instant, I extract from my letter by Monsieur De Bray to Captain Kellett, June 15, 1854:—"You will perceive, by my general correspondence, that I expected Collinson to return with Mecham, and I asked the question of De Bray before he made known to me this second piece of luck or misfortune, as it may eventuate, on your part. Success sharpens the arrow-points of our adversaries; and I see too much of the world around me, not to fear that which reaches my ears now will be made in the hands of designing men a source of annoyance hereafter. Collinson, by my former suspicions, could not convey more than one officer and five men *unprepared* to any of the Hudson's Bay settlements; and even then not without some preparation to meet and aid him. I do not think, having so far succeeded, he would desert his crew and leave them to find their way hither; he would lead them himself; and if I am not wofully mistaken, he is now coming fast on the traces of Mecham, or following up Peel's Channel by the southern coast of Albert Land.

"We are not yet afloat—every blast does mischief—and if we go on at the present rate, we shall blast a canal towards Beechey Island before we get her a foot ahead! I am against powder; but it is so frequently intimated

'that nothing but a blast will do,' that I am occasionally persuaded: very nearly on every occasion it has been followed by a prodigious slip, filling up a week's labour." That very night, after the departure of De Bray, she was afloat!

I will return to the intelligence brought by Monsieur De Bray. On the 3rd of April, 1854, Her Majesty's Ship Resolute and tender being at that time in their Winter Quarters, twenty-eight miles south-west by south of Cape Cockburn, or in latitude 74° 42′ N., longitude 101°22′ W., Captain Kellett despatched Lieutenant Mecham, of the 'Resolute,' and Mr. Krabbé, of the 'Intrepid,' with instructions to visit and examine the depôt at Dealy Island, and then to prosecute their respective journeys; the former to the Princess Royal Islands and Strait, the latter to the 'Investigator,' and ascertain if any of Captain Collinson's parties had visited any of the stations in the rear of Commander M'Clure.

Lieutenant Mecham, with Mr. Krabbé under his command, reached the Sailors' Home at Dealy Island on the 12th, somewhat touched by snow blindness and sore feet at this early period of the season.

The "Home" was found in perfect condition, well banked up with snow on the outside, but the interior perfectly free from drift. Captain Kellett speaks in high terms of his Carpenter, Mr. Deans, who was the architect, and, by the judicious pitch given to the roof, ascribes its freedom from snow. A portion of bread in one of the tanks was found to be slightly damaged, and one rum cask about a quarter short of contents.

They experienced some difficulty in effecting an entry,

owing to the door being barricaded by wet sods and the necessary implements secured *inside*, a caution not lost upon them. After provisioning and securing "the Home," they proceeded on the 13th, deposited a record on "the Sandstone" in Winter Harbour, crossed over Point Hearne, and travelled about three miles off the land towards Cape Providence.

On the 18th they shaped their course for Cape Russell the north-east point of Baring or Banks' Land, and changed their hours of travel from day to night.

About eight miles south of Cape Providence they encountered the first range of heavy hummocks, composed of young ice; having passed through this, which was estimated at five miles in breadth, they entered on the old floes, generally girt by ridges of pressed-up young ice.

About the centre of the Strait, dividing Melville Island from Banks' Land, they found the floes "old, and of greater extent;" and as they approached the southern land, being visited by dense fogs, they frequently found themselves entangled among hummocks and deep snow, which rendered travelling very laborious and harassing.

On the 24th of April the land was indistinctly seen, by telescope, about six miles distant; and shortly after, on the atmosphere clearing, they found that they had passed through the belt of old ice, and before them a large extent of young pressed-up ice presented.

On the 25th they reached a low point at the entrance of an inlet, where they encamped, believing it to be Cape Russell, as the high land near Cape Providence on Melville Island was distinctly perceptible, bearing about north three-quarters east.

At this position Lieutenant Mecham deposited eleven days' provisions, and Mr. Krabbé parted company in the prosecution of his orders to seek the 'Investigator' in the Bay of Mercy, and on his return to the Sailors' Home to re-examine and separate the good from the damaged bread.

Quitting this *cachette*, Lieutenant Mecham proceeded to the south-south-west, following the trend of the land; but on the 26th meeting with very old ice, deeply covered with snow, totally disagreeing in character with that described as occurring in Prince of Wales Strait, moreover the high land on either side terminating abruptly, beyond which the coast appeared to be low and sweeping across the distance, satisfied him that he had not hit upon the intended landfall. He therefore retraced his steps, reduced the allowance to one-half, recovered his *cachette*, and in two journeys was more successful in reaching the entrance of Prince of Wales Straits. The bearings obtained of Melville Island and other observations satisfied him that the land was laid down too far to the eastward.

Having reached a position south of Cape Russell, he deposited his *cache*, and proceeded to the south-westward, keeping about two miles off the land.

Notwithstanding the ice was considerably pressed up, the snow which filled the irregularities was tolerably hard, and travelling good.

On several low points, on which he landed to obtain fuel, he found drift-wood in great abundance.

On the 7th of May, at midnight, he landed on the Princess Royal Islands, where, on examining the cairn,

he was rewarded for his exertions by the discovery of the records left by H.M.S. Enterprise, which, having entered this Strait on 30th of August, 1851, wintered in the pack off in 1851–52; and the document, re-signed 29th of May, 1852, further stated that he passed up to Point Peel, returned, and, after following the west coast of Baring Island as high as latitude 72° 55′ north, had returned, and wintered 1851–52 in latitude 71° 35′ north, longitude 117° 40′ west.

The record also intimated, "that further information of his movements would be found upon an islet in 71° 36′ north, and longitude 119° 0′ west."

Taking provision for ten days, Lieutenant Mecham started that night (morning in travelling time) to the southward, in quest of further information.

After passing Point Gordon the beach was found to be thickly marked by the remains of Esquimaux encampments, and on the 9th of May they succeeded in reaching the islet alluded to, and after several hours' search found records, ten feet magnetic north of a small cairn built upon its summit.

By these documents it appears that a party from the 'Enterprise' (in the sledge Resolution) had visited Point Hearne on Melville Island in the summer of 1852 (Point Hearne is the north-western extreme of Parry's Winter Harbour), and that the other parties had examined the north and south coasts of Prince Albert's Land.

Upon quitting this position on the 27th of August, 1852, Captain Collinson contemplated tracing the Channel between Wollaston and Prince Albert's Land, as set forth in his documents.

After rebuilding the cairn, depositing charts, and full information concerning our movements, as well as complete notices of all the depôts lodged on the Beechey Island route, Lieutenant Mecham commenced his return to Melville Island, reached the Princess Royal Islands on the 13th, examined the whale-boat left there, and found her in good condition; deposited the requisite records, provisioned, and having removed some articles found damaged to a higher and less exposed position, he despatched his sledge along the southern coast of the Straits, and, accompanied by one man with his Satellite (a small sledge or tender), pursued his examination along the northern coast, deposited records at Cape Russell, rejoining his party on the 17th, ready to start. Having built a cairn, deposited records, and collected sufficient fuel (of which they had none) to last them to Melville Island, they moved forward.

On the 19th of May they cleared the Straits, steering direct for Cape Providence.

The ice, extending ten miles off Cape Russell, they found to be that of last year's formation, without a crack. They then crossed a barrier of very heavy old hummocks, reached a lead of old floe, over which they travelled fifteen miles, entered a mixture of heavy hummocks of young pressed-up ice, and small floe-pieces of heavy old ice extending thirty miles. On the 23rd these were cleared about seven miles south by east of Cape Providence.

On the 27th they reached the depôt at Dealy Island, and found orders to return to Beechey Island. They had suffered much from heavy falls of snow, attended by

strong easterly winds, causing snow blindness throughout the party.

At Dealy Island they found that Mr. Krabbé had returned, and gone forward on the 26th, and Lieutenant Hamilton on the 21st.

Lieutenant Mecham observes that they were gratified by the receipt of letters, newspapers, and news of all kinds contributed by their shipmates, which, although it added to their pleasure, did not at all facilitate their rest.

Anxious, we can all understand him to be, to communicate this, his second piece of great success; first the document of Commander M'Clure, and now those from Captain Collinson. Onward he rushed, overtook Mr. Krabbé on the 30th near Point Griffiths, travelled in company to the Depôt at Cape Cockburn, but, finding that he was able to move faster alone, left him to proceed at a more moderate pace, overtaking Lieutenant Hamilton with the dog-sledge off Cape Capel, distressed for food for the animals. They were recruited by some damaged pemmican, in the hope of advancing him with the news to Beechey Island; but, aided by canvas, he managed to keep up, and shortly after reaching Cape Hotham he transferred his sledge to Lieutenant Hamilton, and made the best of his way with the dogs to Beechey Island, reaching it at 4.30 A.M. of the 12th; 152 travelling hours from Dealy Island, and averaging on 61½ journeys in an absence of 70 days, 18·8 geographical, or 21·7 statute miles at the *drag rope!*—a feat, as far as the human constitution and the courage and spirit of the British seaman is concerned, I think without a parallel.

I must now turn to Mr. Krabbé. Parting company

with Lieutenant Mecham (under special orders from Captain Kellett), on the 25th of April, he skirted the beach westerly, and reached the 'Investigator,' in the Bay of Mercy, at 10.30 P.M. on the 5th of May.

The tattered remains of the ensign and pendant were still flying; and such had been the accumulation of drift snow on the northern side of the ship, that they were enabled to walk in over her gunwale. There was also a great quantity on her decks, but not sufficient to prevent them from easily obtaining an entrance by the fore hatchway.

The ship's head was N. 30° W. true, the cable hanging slack under her bow; heeled about 10° to starboard and slightly by the head. No signs of pressure around were perceptible, although the oakum was hanging very loosely out of many of her seams. Her position was S. 12° E., 1400 yards from the cairn, and 426 yards from the nearest point of the beach, her stern being in eleven fathoms water.

On visiting between-decks everything appeared in good order and the lower deck pretty free from frost, but overhead, on the orlop beams, there were great accumulations of ice.

The water had leaked so much into the holds during the preceding summer, that they were now full up to the orlop beams forward, and within ten inches of them abaft, then solid ice. He commenced, in compliance with his Instructions, to clear the ship of all useful stores, and, in order to execute it more comfortably, repair defects of equipment, etc., brought his crew on board.

For the detail of his operations and the stores landed,

I must beg to refer to his written report. The duty being complete on the 11th of May, hatches secured, and the ship nearly as when visited, he commenced his return to Melville Island.

He observes :—"Both in entering and leaving the bay I paid marked attention to the state of the ice in it, and I am confident that there was no water made inside a line from Point Providence (Banks' Land) to Point Back during 1853, but that there was open water during that season for two or three miles in width along the whole line, and which finally met and arrested pieces from the pack around the neighbourhood of Cape Hamilton. Along the cliffs of Banks' Land also there was a belt of new ice from two to four miles wide, terminating in heavy pressure on Point Parker. The pack, from five miles north of Cape Hamilton to within ten miles of Melville Island, was somewhat heavier and older than found in crossing further eastward."

He reached Melville Island on the 26th of May, shortly after midnight, where his orders, left by Lieutenant Hamilton, awaited him. Very little game was seen; Captain Kellett remarks, "Too early to see much." Three deer and four musk-oxen were seen near Cape Hamilton, and three deer at Cape Providence.

The remainder of his journey is comprised in that of Lieutenant Mecham. He reached Beechey Island, in company with Lieutenant Hamilton, on the 13th of June. He notices that about the 31st of May the thaw had commenced with drizzling rain, yet, notwithstanding very low temperatures, sore feet, etc. etc., not a single casualty was experienced by any of the travellers.

Lieutenant Hamilton, with the dog-sledge, was despatched by Captain Kellett to Dealy Island on the 8th of May, charged with orders for Lieutenant Mecham and Mr. Krabbé, to return from thence direct, *viâ* Cape Cockburn, to Beechey Island.

Reaching Dealy Island on the 18th, overland, from Port Griffiths, in the hope of finding musk-oxen or deer for his dogs, but in which he was unsuccessful, he deposited his despatches and commenced his return. He contrived, however, at Cape Bounty to kill two musk-oxen, and twenty-two ptarmigan supplied their own wants.

On the 21st he quitted Dealy Island, and reached the depôt on Byam Martin Island on the 27th. Two dogs out of his five became useless; and the thaw, and other difficulties attending dog-sledges in wet weather, retarded him much, so that he was overtaken by the heavy sledges.

At Cape Cockburn one dog rejoined, but the other was lost. He returned, as before stated, with Mr. Krabbé, on the 12th. Four bears only were seen in his journey, and none came within shot, and he observes:—"Notwithstanding my local knowledge of the hunting grounds of Melville Island, and the time I was enabled to devote to shooting, not more than 300 lbs. of meat was procured, and I should have found great difficulty in supporting my small party of one man and five dogs on the much-talked-of 'resources of the country.'"

That these three officers, with their fine crews, did their duty, must be apparent to the simplest mind; but that they will receive all the weight due to such exertions they have only to look to their Lordships and their

superiors here for the true estimate of the endurance exhibited. The only gap apparent to me is the examination of Point Hearne; but Captain Kellett observes:—

"You will see, by Collinson's record on the 27th of August, 1852, that he was waiting for a start before I left Lowther Island; so that even had I picked up a record of his in the autumn of that year, it would have availed him nothing; news of his whereabouts would certainly have gone home last year by Inglefield, which would have been a great thing.

"That Collinson's officers left a cairn at Point Hearne is next to impossible, for I had eight parties backwards and forwards over that Point, some of them shooting there, others encamped there; it was also one of my positions for a depôt! It has on it plenty of materials for building a cairn. It has been gone over at all seasons, with and without snow.

"Mr. Pim, on his autumn trip in 1852, for the purpose of placing his depôt, reached as far as Cape Providence, where he found a cairn (on its summit); in this cairn he found a pint bottle, with a leaf of a book on algebra in it, but on which there was nothing written. He describes the cairn as very old and moss-grown, so that I suppose it to have been one left by one of Parry's shooting parties. M'Clure did not leave it.

"Collinson in his record says, he will endeavour to go along the south coast of Prince Albert's Land, and then up the strait (by the Esquimaux' drawing, an inlet) between Wollaston and it, that one of his Lieutenants had explored for 130 miles.

"Were he able to penetrate in that direction, and found

it actually a strait, he would reach the north coast of the island, in the deep bight west of Cape Walker, where his progress (his ship) would most certainly be arrested both by heavy ice and probably shoal water (as by Ommanney's report).

"Failing to get through, he would return, and endeavour to get easterly through Dolphin and Union Strait, near which he may have wintered.

"If he wintered there or in its neighbourhood, which is most probable, as you will see how late his season was before he could make any advance, he most certainly will have sent letters home, by way of America, in the spring of 1853, which could not have reached in time for Inglefield. But this time I am convinced that we shall hear of him; and *I think he is clear of Behring's Straits, for he would assuredly have time to get back last autumn.* Should he even have failed in getting back last year, and decided on leaving his ship this spring—were he indeed obliged to come this way—he would make for Port Leopold, the only place he knows of. Austin's departure he knew of, but not his return.

"You may depend upon it Collinson will never reach this strait *except by way of Port Leopold,* where information has been deposited by Pullen."

These are matters of *opinion,* founded on facilities not evident to my senses and on my measures *already adopted* for the relief of Captain Collinson; but although all Captain Kellett's observations are good *pro tanto,* yet I cannot lose sight of the difficulty he would have to encounter if he attempted to reach any of the Hudson's Bay posts.

With the proceeding of Captain Collinson's expedition I have but an indirect connection, viz. that of his relief. But if Commander M'Clure had raised an independent cairn, instead of depositing his notice in that of M'Clintock's, and Captain Collinson's officer had left sufficient notice at Cape Hearne or Cape Providence, then my instructions, or those of Captain Kellett, would have met the case. I understand that Lieutenant Pim's orders permitted of his searching southerly; and I cannot imagine why neither he nor Commander M'Clure did not take steps for informing Captain Collinson, as we have now done in 1854, of the facility of his return to England by the new *North-east Passage*. Had I obtained intelligence of Captain Collinson last year, I certainly would have directed the main force of this Squadron to search and travel round the entire distance of Peel's Strait, meeting them, by relief from my own division, by Cape Batty, Cape Walker, and down Peel's Strait.

With such information as I possess, all my measures have, to my conception, been satisfactorily taken. I fully agree with Captain Kellett on the one great point, and that must depend entirely on the safety of Captain Collinson's *ship* and on *his view* of the retrogressive movement. Unless therefore Captain Collinson's parties reach Beechey Island *before the 22nd of August*, I shall consider that he is retracing his steps, and cannot be expected by this route. Indeed, on very mature reflection, I think after his visit in 1852, *and failing to repeat it in* 1853, that he would not injudiciously waste time in such a pursuit late in this season.

On the 18th of June, Mr. Jenkins (Mate) of the

'North Star' reached the ship, bringing a reinforcement of six new hands. On the 19th, Lieutenant Hamilton, appointed to command the 'Pioneer,' arrived in the dog sledge, and on the 22nd Mr. M'Dougal, Master of 'Resolute.' Commander Osborn returned by dog-sledge to the 'North Star.'

*June* 23.—Our ten-day interval affords, maximum 44·00°; minimum, 18·50°; mean, 28·062°. Today the first true run of water was detected on the land. I caused a hole to be dug and a tin inserted, which very soon filled, affording us a luxury as compared with our vapid tank water.

*June* 25.—We have noticed that the weather here is more influenced at the actual moments of the moon's quartering than at the spring tides, which is opposed to my experience in other parts of the world. Today however the moon changed at noon, but the wind, which has prevailed strong, still continues in heavy gusts; about eight P.M. it abated, and at midnight ceased. But the tide does not appear to coincide today with its natural movements,—not rising at noon by six feet to its natural height, at midnight it flowed six feet above! Can this be due to an easterly gale affecting the tide in Lancaster Sound, as well as in the Queen's Channel, in contrary degrees; in one case preventing the flow, in the other aiding the ebb?

*June* 26.—The available force being now diverted to the extrication of the 'Pioneer,' Commander Richards and Messrs. Herbert and Toms started on a shooting excursion in the vicinity of the first tent. The season appears to be rapidly advancing; the well dug on Satur-

day, the 24th, has overflowed, and the water now runs rapidly, from the snow above; in addition to which, several tufts of saxifrage, which have been barely denuded of snow, have appeared in full bloom.

Several brent-geese flew over our heads on their northern migration; a pair alighted, but were too wary to permit any of our sportsmen to gain within range.

During the process of clearing the dock for the 'Pioneer,' I repeated my experiments on the powers of the men. Three men were engaged,—one with a pick to break up, and two with shovels to throw out. The ice was received in a tarpaulin, and thrown aside as weighed. In twenty minutes they turned out 1756 lbs., which is at the rate of 2·3 tons for three men per hour, or 1756 lbs. per man. These were indifferent men, taken without regard to strength.

*July* 2.—During the last week it has continued to blow with considerable force from east to south-south-east, but as yet we have not been able to detect the slightest movement of the ice; indeed our first intimation of any move in our favour must be from Beechey Island. I strolled over the heights overlooking the channel yesterday, and obtained a very clear view of the distant land near Cape Phillips, as well as the hill-tops of Hamilton Island. My elevation was about eight hundred feet above the sea, and Cape Phillips distant forty-five miles.

The thaw has set in so vigorously, and the rapidity of the inland torrents is so troublesome, that it is not safe to cross many of the ravines. Even the passage from the ship to the shore is becoming very troublesome, by reason of the deep sludge and water retained within the

ice-ridge thrown up in October. In some places it exceeds four feet, and brought adventurers into very awkward dilemmas. The main floe is also covered by very extensive surfaces of water, which the fissures are not sufficiently open yet to carry off. Commander Richards and party returned this evening without success. The few brent-geese and eider-duck are very shy; indeed, after passing the neck of this channel abreast of Cape Bowden, game appears to forsake the land. The experience of two seasons negatives any confidence as to subsisting travellers by the aid of the gun. It is here, as I have found in my visits to other parts of the world, one lucky day may afford full occupation and furnish a heavy supply of game, but that may not be repeated; nor have we any right, from such single events, to delude travellers with prospects of being sustained by a continuance of similar good fortune.

On the 4th Mr. Roche arrived with a dog-sledge from Beechey Island. I gather from Captain Kellett's letter that travelling has now become troublesome; he observes, under date of 3rd of July:—"It was, and is at this moment, *more swimming than walking* on the floe. A good deal of caution is necessary. Mr. Haswell had a narrow escape the other day; he fell in, and could not possibly have got out but by the assistance of another person.

"We have today twenty-one men on the sick list; some few standards that will not be off before we reach England. Out of this number three only are 'Investigator's' men, who have been ill nearly the last three years. The remainder of her men are looking right well,

much better than ours. The difference in health in these crews plainly shows it is not the climate, or description of provision, does the mischief, but the hard work in travelling. In 1852–53–54 'Investigators' had no travelling, and only sufficient exercise to keep them in health, whereas our crews made enormous journeys; and depend upon it, the constant dragging and pressure of the belt on a man's chest, for such long periods, is more injurious than any other work a man can be given to perform.

"What to give Jack, in recompense for his hard work, —whether a mark of distinction, situations for the old and worthy, or more money,—I cannot say, but I hope you will place their merits before their Lordships and the country, and not allow their doings to die on being paid off. This will be, at least, some pleasure to the poor fellows, for Arctic Jacks all read. I feel that I may safely say, that their labour cannot be exaggerated, and I fear an idea of it cannot be exaggerated."

In all these remarks I fully concur; and I hope that my efforts may be rendered needless by the *voluntary grant* from Government of an *adequate remuneration*, not only to this Squadron, but to all who have been included, not in *geographic amusement*, but in the more *distressing* and *continued searches for our missing countrymen*.

"All the healthy portion of 'North Star's' crew are up with you. Of my own crew I find, by medical returns (which I send to you now complete), there are thirty men fit for long service, No. 1's. Of these, *fifteen are officers*, so that I think you will deem it expedient to delay the volunteering until the steamer arrives."

I insert the following, to show that, at all events, the next in command seemed to think with me, that prudent forethought was necessary, and that, circumstanced as we are, *orders should precede the chance of events;* and those I had long contemplated.

"You ought now to write plain instructions for the officer commanding here,—what he is to do on arrival of vessels from England, in case of his breaking out before any can arrive; and what he is to do, suppose there should be open water and no vessel, in case of being carried down with the pack,—whether he is to wait at any particular rendezvous for you, and until what time. *But you know how uncertain everything is in this country, and how necessary it is to have orders to meet all contingencies.*"

It is evident some change of mind must have influenced these remarks, as my intention up to this moment and to the last will be, if such should be the pleasure of the Admiralty and not left to my judgment, to return Captain Kellett, with the necessary volunteers, to the 'Resolute.'

The following order was issued, directed to all Captains and Commanders, etc.:—

*By* Sir Edward Belcher, Kt., C.B., *Captain of H.M.S. Assistance, and in Command of the Arctic Searching Squadron.*

(General Memorandum.)

As unforeseen events may drive the 'North Star' from her present ice-bound position at Beechey Island, and force her out of the Lancaster Strait,

The Senior Officer who may at that time be on board will repair first to Cape Warrender, then to Port Dundas, and finally back to Beechey Island.

Should the ice and weather unfortunately prevent the *possibility* of return to Beechey Island, the officer in command will *remain* at Port Dundas until the 10th of September.

After that date (10th of September) he will repair to Pond's Bay, and examine it closely (*at the anchorage*) for any vessel, steamer, or sailing vessel waiting there, and, if possible, leave records of such visit.

Failing to meet with any of this Squadron, or the steamer sent out for relief, he will proceed to England, reporting his proceedings to the Secretary of the Admiralty.

Should he meet with any of the steamers on their way hither, he will request to be towed to Port Dundas, there to await my arrival, or until the 10th of September, as above.

*Given under my hand on board H.M.S. Assistance, this 6th day of July*, 1854, *in Wellington Channel.*

EDWARD BELCHER.

*To all Captains and Commanders doing duty at Beechey Island Depôt.*

And in a letter of the 7th, the day following, thinking that Captain Kellett would inhabit the house on Beechey Island, I write:—"I herewith forward to you a document for the guidance of the person who may find himself in command, should the 'North Star' be driven out of the bay before my arrival, a circumstance not of likely occurrence before the end of August next."

On the 6th of July the 'Pioneer' was again afloat, and we succeeded in getting several revolutions out of the shaft, which was supposed to be materially injured, and eventually she was reported to be "fit for active service."

## CHAPTER VII.

Thaw.—Pools of Water.—Cracks.—Final Preparations.—Extracts from Despatch.—Volunteers to proceed to the 'Assistance.'—Effect of Tides.—State of the Ice.—Thoughts on Flitting.—Evils of Detention.—Withdraw the Crews.—Arrival of the 'Phœnix' and 'Talbot.'—Final Instructions.—Tablet to M. Bellot.—Beechey Island. —Navy Board Inlet.—Lieveley.—Arrive at Cork.

THE 'Assistance' and 'Pioneer' were now in all respects ready for sea at any moment the ice may afford opportunity. The thaw has worked so rapidly during the last ten days, that the Crystal Palace has not only vanished, but all the ground about it is entirely denuded of snow. My duties here being complete, preparations were made for my journey to Beechey Island, and full instructions, in the spirit of the preceding memorandum, drawn up for the guidance of Commander Richards, under every imaginable difficulty.

On the 12th of July, shortly after eight A.M., with a fresh breeze from east-south-east, and drizzling rain, our party, consisting of four sledges and two boats, accompanied by Mr. Loney, Messrs. Nares, Jenkins, Grove, and Pim, left the ship for Beechey Island. The chronometers, under the special charge of Mr. Loney, were

placed in the 'Hamilton,' but the jarring over the rough ice induced me to transfer them to the gig, which was secured on one of our newly-constructed sledges, adapted for this special service.

With reference to the travelling, and state of the ice travelled over, I find the following rough notes. First, as to the chances of the break-up this season. The frequency of very extensive cracks, transverse to the Channel, or running east and west, seem to offer hopes of a general disruption, as soon as the ice about Beechey Island affords a space for southerly motion. Next, these cracks, which in some instances had opened to widths of fifteen and sixteen feet, rendered sledge travel very precarious. Vast quantities of water, resulting from extensive thaws, overlaid the ice, presenting almost the appearance of lakes. In many instances very deep holes occurred, but the general depth of the worst that we travelled over did not exceed fourteen inches. This depth, to those marching and dragging the sledges, was *assumed* as "hip-high," to which limit they certainly wetted; but the criterion, from which my opinion is deduced, is founded on the *fact* that the bottoms of the largest sledges were not more than fourteen inches in height, and the cargoes were not wet. One fact is worth a dozen assertions. Knee-deep would be eighteen inches, and hip-deep heavy wading. I know full well the depressing effect of ten inches' water, and to overcome that, during several hours' heavy drag, is killing. Once wet, the greater part of a man's courage is damped; and for that day, or until he can obtain a change on reaching his tent at night, his value at the drag-belt is to a considerable

extent damaged. Yet for weeks this has been the condition of those engaged in the long journeys of the latter part of the season.

Such are the ills, the difficulties, the wearing miseries entailed on those engaged on this Arctic search. Far from their ship, they feel that life can only be preserved by such continuous labour, such endurance, as we should hesitate to inflict on the horse, *if he could sustain it* (?). Let any of the hardiest of my readers try the effect of this on his own person for one day, under a temperature even of 24°, or 8° below freezing, and say, does double pay compensate for *ninety-five or a hundred continuous days of such fatigue?*

In some instances this surface water was seen to rush with considerable velocity to escape by the fissures; but in others, where a seal-hole only offered its funnel shape, the vortex was highly dangerous to man or beast, and at times attended with considerable noise.

The floe itself, at the fissures, appeared to maintain off shore a mean thickness of four feet, but seldom reached six or seven feet.

Between our two first tents, a distance of twenty geographical miles, the open cracks, exciting hopes of relief this season, occurred at intervals of nearly each mile. These were fortunately bridged by ice at narrow points, selected by the officers in advance, or occasionally floating masses of sufficient bulk were brought up to bear the weight, and with our accumulated force each sledge was separately passed over at railway speed. But for such chances we should have been compelled to unload and reload, ferrying our cargoes across, which would have

entailed considerable delay. Fortunately we were thus aided throughout our journey.

On reaching the Sergeant's command at Baring Rendezvous (Cape Bowden), I found that he and his aid had shot 108 dovekies, which, added to others shot by my worthy companions, Nares and Jenkins, *en route*, afforded our crews a comfortable addition to their rations, and also a supply for the ship. Two sledges having deposited their cargoes here, returned to the 'Assistance.'

At this depôt we had now accumulated sufficient rations, fuel, etc., to aid our entire crews, should necessity impel them to seek this route. About midnight on the 16th we entered Union Bay, where we were immediately discovered from the Island Station, and a party of twenty men, forwarded by Captain Kellett to aid our men, joined most opportunely, for they had not been applied more than ten minutes to the drag-ropes of the gig when her sledge broke down, and it was found necessary to drag her on her keel the remainder of the journey.

Whilst engaged on this duty, Mr. Jenkins, ever alive to his duty, and encouraging his men, received a very severe squeeze between the boat and a piece of ice, completely crippling him for many days.

About two A.M., on entering the floe of Erebus and Terror Bay, I was met by Captain Kellett, M'Clure, Pullen, and M'Clintock, and very shortly after safely lodged in the depôt enjoying the appellation of 'Northumberland House.' Indeed, from the care and attention manifest in all the preparations for my comfort by Captain Kellett and Pullen, I feel satisfied that I enjoyed myself infinitely more, and in my own way, than if I had been at

that instant near Charing Cross. A hot bath and rest relieved me. Of sleep I will say nothing; but at my usual hour I found myself at breakfast beside a very comfortable fire.

Having now established my head-quarters at Northumberland House, or, more strictly speaking, with my pendant in my gig, for which purpose I brought with me her own crew, it may not perhaps be amiss to explain that unless the ship to which a Captain belongs is present, or represented by one of her boats, a question may arise as to the power of command; and notwithstanding all precedents in Arctic service indicate this power to be carried from ship to ship in the event of accident, it does not unmistakably render it a law of the service, to which persons inclined to stir up discord may have recourse.

Measures were now adopted for meeting every emergency, in the event of the sudden appearance of vessels from England; either for reoccupying or abandoning the vessels, as well as completing this depôt, to afford relief to any parties advancing, or even to subsist part of our own crews, should I find it necessary to despatch the 'North Star' to England at the earliest open water, remaining behind myself to await the extrication of the 'Assistance.' At present such was my intention, as may be gathered from my public despatch of the 15th of August, 1854, written at a moment when I had determined to send Captain Kellett home in command of the 'North Star.'

Having in the previous part of my narrative given the greater portion, I shall merely add such extracts as relate to my views up to that date.

"I have thought fit to erect here, on a commanding terrace in rear of this house, a substantial pillar, on which, stamped on leaden plates, the names and particulars relative to all who have died in the execution of their duty in this Expedition are recorded."

"At this present date no sign of open water cheers us, but I have the satisfaction of knowing that on the 6th H.M.S. Assistance and Pioneer were blown out. The latter grounded, and the engines could not be worked. She was soon got afloat, and my communication, dated three A.M. on the 10th, from Commander Richards, places the ship near Cape Grinnell, not far from the spot where the gallant Bellot met his untimely end."

"Considering that our northern and western searches have now terminated, I cannot but revert to the matters involved in this service entrusted to my direction. Although it was clearly explained, indeed most emphatically enjoined on me, that the discovery of new land had no part in my proposed duties, but the most rigorous and extended search for traces of the missing Expedition was alone to occupy my mind: still, the one object, in the region more particularly visited by me, could not be satisfactorily executed without the label of truth impressed on its every feature."

"With both views before me, the commanders of parties were directed to make straight courses to the utmost extent of travel from point to point, so far as provision would sustain them forward and back."

"On the homeward journey, they, with lighter loads, had time to review eligible lines of re-search, and the orders given to the return commissariat sledges filled up

all minor gaps, until the whole bore the appearance, at least, of a strict survey."

"But secondary to these main instructions was the effort to trace any communication with the ships under Captain Collinson's command, and to deposit adequate supplies to aid them, in retreat, at the most eligible positions."

"That our efforts have entirely failed in our first and most exciting search rests mainly, I believe, on the *conviction* that the 'Erebus' and 'Terror' did not advance westerly, or northerly, beyond Beechey Island; and it is a matter of no common importance to my mind, and adverse to any *intention* of a northern movement, that not one single *reliable* trace of detached sporting parties has been met with *northerly*. But, on the other hand, *easterly*, at points where we should naturally expect explorers would be averse to proceed, numerous traces of temporary sojourn abound, fatal, in my mind, to any idea of further western discovery, and specially in the direction of Wellington Channel."

"I admit, now that we *know* that navigable channels exist on either sides of Baillie Hamilton and Dundas Islands, that it was not unnatural to suppose that the ships might have escaped westerly by that route; but, speaking as a surveyor, or as a simple navigator, had I travelled from hence to the heights of Cape Osborn, or, further north, to Cape Hogarth, and beheld from thence, as I have done on the latter, and near the former, the clear panoramic view of Wellington Channel, I would not have deemed the Queen's Channel of sufficient importance to risk my *vessels for exploration*, nor of equal

value to the Byam Martin Strait, easier of approach, and, for every object *attainable*, more secure than the course by the Wellington Channel."

"I saw no features *from the eastern shores* to warrant any passage, nor is it fair to judge, from the very extraordinary season of 1852, that successive years would afford similar facility. *When* H.M.S. Assistance escapes out of Wellington Channel, then I may be able to make further remarks; but this I know, that 1853 and 1854 offered no invitations to the *judicious navigator* to try his chance late in the season, merely perhaps to enter the great bay where the 'Assistance' spent her dreary winter."

"My impression still clings to the escape out of Lancaster Sound, or to a fatal issue off Cape Riley, and that traces, if ever discovered, must be sought from the Esquimaux of the southern land (Cape Cockburn)."

"Having thus dismissed our disappointed hopes of traces where we have sought in vain, I arrive at the discovery of the position of H.M.S. Investigator and the present safety of her Captain and crew."

"However anxious I may be for a similar result to Captain Collinson and party, still I am thankful that the records place him in a region free from the perils of Arctic ice, in which Captain M'Clure considers no ship could endure. He had, at the latest account, two modes of escape, one by the road he came, the other—on which I place but little reliance, on account of its difficulties—by the land journey to some of the Hudson Bay posts; unless indeed he met Dr. Rae, in which case competent guides would materially alter the face of his difficulties."

"But I have not been unmindful of every course which he might adopt: the Melville Island chain is complete and adequately stored; at Cape Bunny, should he take up the Peel Strait, he will find supplies, and notices where to find more; at Port Leopold the house is not fit to shelter his people, but I think the materials for sustaining life are not wanting."

"Here, the house, the position of the provisions, fuel, and stores, offer the home provided for Sir John Franklin, and where possibly I may yet have to prove that another winter can be endured."

"Until the month of September is half expended I shall, if detained here, still cling to the hope of his joining us, and of the arrival of steamers adequate to our need in conveying so many persons to our country without the risk of one bottom."

"*August* 21, 1854.—Open water in every direction. The non-appearance of H.M.S. Assistance, and the opinion here, that I ought to decide on the spot as to her future fate, compels me to close. If Captain Kellett should be blown out in H.M.S. North Star and reach England, I must refer to him for my latest intentions."

Such were then my feelings on the 21st of August, and, unless pressed at that date by that screw—general opinion, I did not intend to have quitted my post until the 26th, intending first to learn the nature of my new Instructions, and then decide. It is immaterial to notice what were the arguments or opinions advanced, as the decision at which I arrived would render me alone responsible.

I made up my mind to proceed to the ship, taking

with me a suite of officers, of constitutions competent to withstand the possibility of being detained another winter, but not to be left unless it appeared probable that, in the ordinary course of nature, the 'Assistance' might drift out of Lancaster Sound. I had not the most remote intention of altering my design of securing the return of the entire crews to England this season, unless something in my expected orders should change this determination.

At the latest moment I believed that the ice was fast breaking up in Wellington Channel, and for the last few days I had been hourly expecting the report from the summit of Beechey Island, where a constant watch was maintained, that the 'Assistance' was in sight; but the result satisfies me that no reliable judgment can be formed, by any persons at Beechey Island, of what goes on beyond fifteen miles from it, and therefore I reject the admissibility of any opinions formed by those who did not accompany me.

In justice to the officers who volunteered I will name them:—Commander M'Clintock; Mr. Robert C. Scott, Assistant-Surgeon; Mr. Court, Acting-Master (Investigator); and Mr. Jenkins, Mate (North Star). These gentlemen volunteered for any service which I might direct. Dr. Domville also volunteered, but I considered his duties required that he should accompany the crew of the 'Resolute.'

Every precaution having been adopted to meet the chances of the 'North Star' being blown out, and Dr. Lyall having accompanied me for medical surveys, our party embarked in my gig at eleven A.M. on the 23rd of

August, and after a very heavy pull, reached Point Innes in four hours, and as the boat, so heavily encumbered, made indifferent progress, the supernumeraries volunteered to march forward to Cape Bowden.

Moving forward with the gig, accompanied by Dr. Lyall, we reached the floe edge about eight miles to the southward of Baring Rendezvous, and with five hands, the Surgeon, and myself, we commenced dragging the gig over the floe. We were ultimately assisted by Mr. Court, the Sergeant, and one man; but the work was attended with great labour, and we did not reach the Rendezvous until eight P.M. Notice had been previously forwarded by express courier to the 'Assistance,' directing a party to be advanced to meet me, and intelligence of their approach reaching me at eight A.M. the following morning, I sent to stop them until we came up, by which means much labour was saved. After a total interval of thirty-seven hours, I was again in command on board the 'Assistance.'

During this journey I saw clearly, that without a heavy gale, and probably a fatal result to the vessels, not the remotest chance of their extrication offered this season in time to reach England.

But my reasons probably had a sounder foundation; indeed I do not imagine were even thought of by those around me. The question, in my mind, was dependent on the tides; and I had well proved, by experiments conducted at Beechey Island, Cape Bowden, and the late Winter Quarters, that the flood course did not run from Lancaster Sound *through* Wellington and the Queen's Channel, but that the northern flood from the Arctic

Ocean *met* that from Lancaster Sound, as nearly as I could determine, at Cape Bowden, and much in the same manner as the Channel and North Sea tides meet about Dover. Hence it was clear, to my mind, that without a great effort of Nature to clear away the ice *northerly* as well as *southerly* of that *parallel*, antagonistic forces must continue to *compress* any loose floes together, and *perfect* a solid barrier in that, the narrowest, portion of Wellington Channel.

Such had been clearly Nature's operation during the interval which had elapsed since I travelled over this floe; every crack had been *pressed home—cemented afresh*, and so far had winter commenced, that the pools, resulting from late thaws, were covered with ice of such thickness as to bear the weight of men and boat.

In my notes I observe:—"Over an expanse of twenty-four miles these cracks had occurred in as many intervals; but now one solid barrier, cemented in many places by young ice, and where pools occurred on the floe, so hardly frozen as to bear both men and sledge, left but little hope of release until too late in the season to afford any prospect of reaching Beechey Island this year. And it was still a doubtful question, if this barrier should be shivered by any competent effort of Nature (such as that which overwhelmed poor Bellot last year), if our vessels could survive the inevitable pressure to which they would be subjected.

Looking to the present positions of the 'Assistance' and 'Pioneer,' on the upper portion of the channel, now completely barred to the southward, I found that the motions of the northern tides allowed of a play of forty

feet on the fissure into which they had been warped; but the direction of this fissure was rather inclined to the chord of the bay off which they were fixed, and it terminated as it approached the southern point. This motion subjected the vessels to nips, which had already fractured the docks cut for them, and caused them to heel occasionally, at one time not without danger; but the most troublesome piece eventually slipped under, and the abutting floes left them, until some new disturbance, temporarily secure; such however was the thickness of the surrounding ice (seven feet), that any *decided nip* left no hope of saving the vessels: it was too stubborn to bend or break.

I had fully discussed all these subjects with those qualified to aid me, and no adverse opinion to my own was in the remotest degree offered; there were none present who sought to become martyrs, nor were any inclined to make show of feelings by which they were not actuated. Indeed I feel it almost needless to remark, that whatever opinions might have been tendered, they would never have been advanced by me to shield me from that responsibility which belonged alone to the Commander of this Expedition.

Weighing fully the chances, and the apparent impossibility of any disruption of the ice, without a similar gale to that of the 18th of August last year—that period also having passed; the danger if it did recur; the lateness of the season, with unmistakable symptoms of early winter; and the difficulties which further hesitation might entail,—I decided that I should best fulfil my pledge to their Lordships, and my duty to my country,

as well as to the crews under my command (for none volunteered to remain out), by withdrawing them, and proceeding to the 'North Star.' Confident I am that those vessels would cease to float before the autumn gales conclude; and from what I saw, and with the habit of judging on all such matters, as this narrative will evince, much more sanguinely than those associated with me, no hope of their southern drift can be entertained, —and for these reasons:—we know of no southern drift; we have never experienced northern gales; we do possess *facts* to prove the reverse; portions of the 'Breadalbane' reached our Winter Quarters, and that *without a gale:* that disaster, bearing date the 21st of August, occurring three days after the gale which disturbed the ice of this Channel.

By those only who have devoted their time and interest even to the merest tub that swims, and has been constituted a home, can our feelings be appreciated. It becomes the child of our adoption, the only object in these remote regions on which we lavish all our affections! After the excited hopes formed by our puny experience at Beechey Island of the then deemed certain rescue of the craft that would carry us home in comparative luxury, how dreadfully were we disappointed! and prepared as we were by months of anticipation, the preparation for parting was not effected so rapidly as imagined. Indeed, when the order issued "to prepare to flit," the efforts to save property only then appeared to have awakened us to the reality of the losses we were doomed to suffer. Notwithstanding the repeated sledge journeys, mainly, it is true, laden with instruments and

other public property, much that could not now be carried must remain to be sacrificed.

Many painful thoughts forced themselves upon my attention; but the duty, severe as it was, must be executed. Nevertheless, on reflection, it was consoling to feel that the specific objects of the Expedition, as far as the powers of our crew were concerned, had been carried to the extreme bounds of *reason*.

I am aware that I have the credit of exacting from those who are associated with me the full amount of labour which my own frame, impelled by the customary excitement of "command," could endure. But, regarding the particular service on which we are engaged, I cannot imagine it possible that any duty would be deemed onerous, even if it hazarded life or limb; and it affords me great satisfaction here to express that in every instance where selection has been made, I have been fully and ably supported, and most especially by my energetic Second, Commander Richards.

Our mission was not directed to the discovery of new lands, or of the North-west Passage. It was simply to search for traces of our missing countrymen "on reasonable and reliable sources;" not to push, for selfish ends, on lines of coast where no reasonable hope could exist or seemed to promise, nor by a desire of making a show on paper of extended discovery, to undermine the constitutions of my men, who might yet be doomed to endure another winter in this trying, desolate region.

This latter subject, too, was one which was pregnant with evil! So long as a fair and exciting object could be entertained, demanding even the most intense exer-

tion as well as privation, the spirits and high courage of our energetic men were easily maintained, and I feared not the chances of disease. But one season had now passed simply in the labour of extricating ourselves. Another, sickened by failure, or even protracted delay, would cast a damp which could only be comprehended by those concerned. The question naturally resulting to the officer in command would be one simply of judgment. Is the sacrifice of life to be weighed against the loss of timber, which, if returned to England, as all previous experience has shown, is of no further value as a sailing-vessel, but simply to be sold "to break up"?

If the vessels had been extricated last season, the 'North Star' alone would have carried to England the crew of the 'Investigator' and invalids of the Squadron. Rumour, to suit some interested purpose, had given out my intention to return to England, but nothing contained in my letters or despatches to Government warranted such an assertion. The measures contemplated would have placed the different vessels in ports along the western side of Baffin's Bay, from whence it was intended to make inland journeys in spring, in order to communicate with the natives, and endeavour to learn from them whether they had seen the vessels *sail out of* Lancaster Sound, or whether any distressed individuals had been encountered on that shore, setting at rest the rumours which were obtained from the Pond's Bay tribe in 1849.

On the full moon of the 25th of August, at six A.M., the crew of the 'Assistance' allotted to the cutters and a life-boat belonging to the 'Pioneer' were assembled in travelling order on the floe. The decks had been cleanly

swept, the cabins put in order, and, accompanied by Commander Richards, the ship fully inspected; the hatchways were already securely caulked down, leaving only the small aperture to my cabin. The colours, pendant, and Jack were so secured that they might be deemed "*nailed to the mast*," and the last tapping of the caulker's mallet at my companion hatch found an echo on many a heart, as if we had encoffined some cherished object. Accompanied by Commander Richards, we silently passed over the side,—no cheers, indeed no sounds escaped, our hearts were too full! Turning our backs upon our ships, we pursued our cheerless route over the floe, leaving behind our home, and seeking, for aught we knew, merely the change to the depôt at Beechey Island.

My own sledge crew carried me rapidly to Cape Bowden, when, after a rest, the gig was immediately pushed forward to the floe-edge, and in twenty-five hours from the period of quitting, I again became the tenant of Northumberland House.

The remainder of the crew, under Commander Richards, experienced heavy labour dragging the boats over the ice, and eventually, having left behind on the floe a great quantity of luggage, reached about twelve hours later, not however without leaving behind a party of eighteen men, which the boats could not carry, and who were compelled to travel to Cape Innes by land.

During my absence matters had been so far expedited by Captain Kellett, that about noon on the 26th of August the house was left, and sealed, complete with every kind of supply for sixty men for one year. Within, in a

powder-case, every necessary document and information was secured. Behind the house, in the pillar erected to the memory of all who had died on this Expedition, further information was deposited.

The crews of the 'Assistance,' 'Resolute,' and 'Investigator' were now embarked together on board the 'North Star,' and some of our boats being yet absent, we slipped our hawsers and made sail westerly to meet them.

It was about this period last year that H.M.S. Phœnix quitted for England. Some doubted her escape from the ice in Lancaster Sound, and the prevailing "pressure from without" was, that we had no time to spare. What my own feelings were can be readily imagined, when I found myself with officers and crews crammed together on the chance of one frail bark.

Some, it is true, had been four winters in the ice; but I consider that the sledge crews of our Squadron were infinitely weaker in constitution. Such then being our preparation to hazard the buffeting of Baffin's Bay, we had fairly taken our departure. The day was cold and gloomy, attended with snow and haze, and I had just taken possession of my cabin, when "a steamer towing a barque" was reported in the direction of Cape Riley. They proved to be the 'Phœnix' and 'Talbot,' with further supplies, and Instructions from the Admiralty. Most fortunately they reached at this moment, as a few hours later we should probably have missed them, my determination, then taken, being to make for Port Leopold and the southern shore, and hauling across from Admiralty Inlet, to visit Port Dundas.

It will now be necessary for me to allude specifically to the Instructions sent to me by the Lords Commissioners of the Admiralty, No. III., Vol. I., page 9.

In the second paragraph their Lordships direct my special attention to the withdrawal *at once* of the whole force now employed in the search of Sir J. Franklin; they refrain from issuing any positive Instructions of how I am to act, or what steps to take, as they must depend on the knowledge I possessed.

The third paragraph:—(1.) "The crews of the 'Enterprise' and 'Investigator,' if at Banks' Land, to be withdrawn." I read those orders as explicit, had I not taken that step (at this late period of the season impossible), to abandon the 'Resolute.' "If any trace has been discovered, or any *further search* should be deemed feasible, then I may consult the Seniors of Her Majesty's Ships on the question of *further search*." No such case arose. Their Lordships anticipated the *impossibility* of abandoning the 'Resolute' this season; but *that* I had *remedied by my decision*, and it was only under the *impossibility* that she was to remain.

The paragraph relating to Captain Collinson I had clearly met by all my arrangements, and I deemed it, under the information I possessed, injudicious to leave a vessel at Beechey Island.

Their Lordships finally acquaint me, that their *great object* is to recall, with the *least possible delay*, the whole of the *ships or crews* so employed, *if it can be done; if not possible to do so*, they leave it to my judgment to do that which appears to me necessary, adding, "All their Lordships can do is to confide in your judgment; and

they authorize you to take such steps, and give such orders, and to make such exchanges of officers and men, as you may deem necessary for carrying their wishes into effect."

Thus it will be manifest to my readers that the most full and complete powers here assigned to me had been contemplated and carried out before their arrival, simply because my communications, from the moment of nomination to this command, all indicated *a precise duty*, —first, to command and prosecute whilst *sensible hope* remained; next, not to drive on helter-skelter to pursue discovery; next, to determine when, or where, further search was to cease; and, finally, not to hesitate in abandoning the vessels, when I considered that step was prudent.

But, upon the matter of *abandonment*, my orders are explicit, merely the withdrawal of crews ('Investigator' excepted), leaving the vessels in a condition to be *re-occupied*, should any part of my Instructions warrant such an injudicious step. For myself, foreseeing difficulty as to *command*, if I *abandoned*, I brought my gig with my pendant, dating all orders from her, and considering myself simply "on duty until the further pleasure of my Lords Commissioners of the Admiralty should be made known."

By the arrival of these vessels, I was enabled to land a few more provisions, clothing, and four boats, which, with the 'Mary' yacht, left by Sir John Ross, would aid any party arriving to reach Pond's Bay.

In my despatch to their Lordships I observe:—"I trust, from the contents of my previous despatches, that

it will be manifest to their Lordships that I could not entertain any idea of leaving behind any vessel, officer, or crew here, to prosecute a duty, I trust, complete, but on which our united force and well-trained officers had prosecuted their researches to the extreme to which human endurance could be carried; nor could I possibly frame orders, or, in my then condition, select any officer to carry them into effect, without some definite Instruction as to the service *for which* he was to be employed, inasmuch as the only objects to which my attention was directed were, "search for Sir John Franklin, and relief to Captain Collinson, *if not heard of.*"

"But I trust the latter has already reached a place of safety, and that relief from England, taking into consideration the *caches* laid out, will, under a very mature consideration of the whole circumstances, be better arranged by a steamer direct from England, under a proper officer, fully in time to meet any exigency, and unshackled by towing transports."

In the discussion of these matters in England it reads very simple, that particular provision is to be made, that stores have been forwarded, and that officers and men are to be left out to carry forward any service which may appear to me to be called for; indeed confidential letters, which were but mere traps on which I was to wreck myself, boldly urged the prosecution of rash unconsidered adventures adverse to my Instructions.

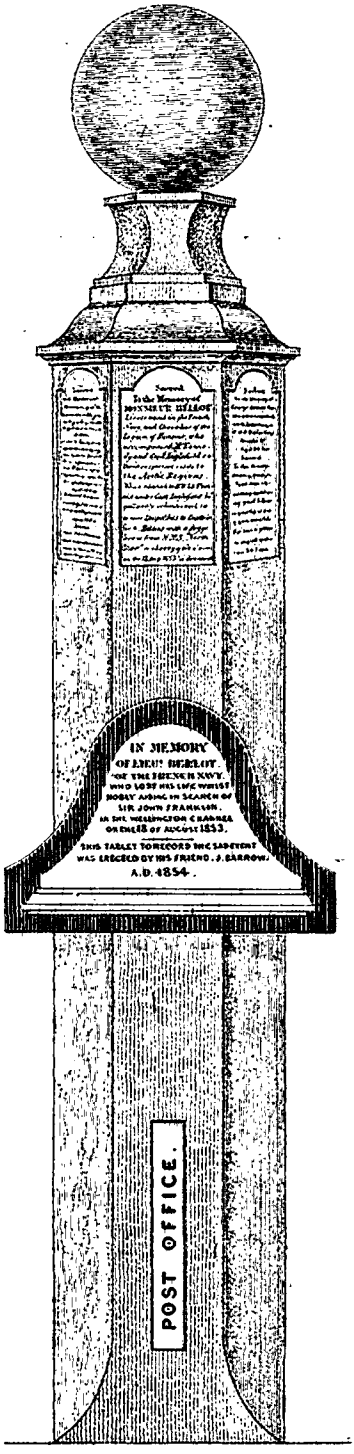
All these matters might have perplexed, but certainly did not change, my mind; moreover, I was unable to trace amongst any of my qualified associates any inclination for Quixotism. By the first intention of my In-

structions, a steamer and one sailing vessel might remain behind. This clearly indicated one of the tenders, and possibly the 'Talbot,' but, if taken literally, then the 'Phœnix' and 'Talbot,' reducing the conveyance of the assembled crews again to the 'North Star.' This was clearly injudicious, and not to be entertained. The *three* vessels were not adequate to properly accommodate and provide water for the crews.

The forwarding of stores, excepting for deposit at Beechey Island, it has already been observed, could not relieve any parties detained to the westward of that position, except by a steamer advancing this *autumn, if the ice should open,* or by a *competent sledge force* next spring. If I left a small crew behind, no such *competent force* would be available.

Again, as to the selection of officers. Those who had been fully tested, and were known to be capable of carrying out my views in their true intent and in conformity with my confidential Instructions, must be sought amongst the volunteers of my own particular set. Here again I must be guided by the opinions of medical men; and, as I have mentioned in my despatches, the selection would have fallen on Commander M'Clintock. He, by conference in March, had been made fully acquainted with all that was necessary; he was the oldest practical Arctic officer; and I had full confidence that his appointment would be most satisfactory, not only to those around me, but also to their Lordships.

Such then being the condition in which we were found by the 'Phœnix,' I have not, even in my public despatches, in the remotest manner alluded to matters


IN MEMORY
OF LIEUT. BERTHON
OF THE FRENCH NAVY
WHO LOST HIS LIFE WHILST
BOLDLY AIDING IN SEARCH OF
SIR JOHN FRANKLIN.
IN THE WELLINGTON CHANNEL
ON THE 18 OF AUGUST 1853.
THIS TABLET TO RECORD THE SAD EVENT
WAS ERECTED BY HIS FRIEND J. BARROW.
A.D. 1854.
POST OFFICE.

which seemed to have made more impression on the minds of those around than they did on me.

This was the report of Captain Inglefield and his Ice-master on the state of the ice in Baffin's Bay and mouth of Lancaster Sound, or, in plain terms, the doubt of the vessels passing out of Lancaster Sound and clearing the ice of Baffin's Bay without encountering very heavy difficulties; indeed, it appeared to be mere matter of chance, from the various dangers into which the 'Phœnix' and 'Talbot' had been driven (by Captain Inglefield's public letter), that they had been rescued from disasters from which we could not have relieved them, and that their mission to us would, in such case, have proved entirely abortive.

It required no argument with me to determine what my duty was; unfortunately time was not available to carry out what the service prescribed. I had but one steamer, and that vessel must accompany and aid the sailing vessels until clear of the ice of Baffin's Bay, otherwise I should have sent an officer and crew into the 'Talbot' to take home direct the crew of the 'Investigator;' as in the event of accident to them, I had heard enough from those around me to feel that such a topic would not fail to be worked with powerful effect to my annoyance.

The landing of boats and further additions to the depôt entailing some delay, the vessels were made fast to the floe; I therefore took advantage of this detention to affix to our cenotaph a marble tablet to the memory of Monsieur Bellot, brought out by the 'Phœnix.' This tablet had been executed for Mr. Barrow, of the Admi-

ralty, in token of his esteem for this gallant volunteer; and was finished barely in time to go out by the 'Phœnix;' his wish was to have it placed as near the spot of the fatal disaster as convenient; but I trust that the position, in the company of our other deceased members of the Expedition, may not be deemed inappropriate. Having assembled the officers in command, and drawn up the Marines of the 'Phœnix' in front of the pillar, the customary compliment of three volleys, due to an officer of his rank, was paid at the moment of completion.

I will conclude this piece of service by the extract from my public despatch.

"These matters arranged, fresh notices added to those in the Depôt House (well secured in a powder case), fifteen tons of coal placed ready at the house (brought from Cape Riley, where it had been landed with provisions from 'Breadalbane'), one excellent patent cooking-range, adapted for seventy or one hundred men, in complete order under a temporary kitchen, a good stove within, and indeed every comfort which I could expect for myself had I *wintered* at this island, all of which had occupied the constant attention of Captain Kellett and myself for the last three months, I directed Captain Inglefield to receive Captain Kellett and myself, with my gig-crew and retinue, on board H.M.S. Phœnix; and portions of the crews of the other vessels of my Squadron having been distributed on board the 'North Star' and 'Talbot,' we again cast off from the floe, shaping a course for Port Leopold."

At that position I intended, if possible, to land, make good the deficiencies, and leave a boat and records; but

in this I was disappointed, the floe barring a nearer approach than fifteen or twenty miles from the nearest part of the island.

This forcibly brought to my mind the utter fallacy of any opinions formed on ice matters, and more especially as to the distance of open water, so constantly asserted to be viewed from elevated positions. Some had ventured to see up Barrow Strait, and that open water extended from Beechey Island to the southern coast.

But leaving opinion to its fate, what was the *fact?* Until we reached one hour's run with vessels in tow, the floe-edge was not discovered from the crow's-nest,—and how distant? *Certainly not five miles!* That ice would not permit Barrow Strait to be relieved until it drifted away. Are we entitled, after such a glaring fact before us, to attach any credit to imagination, or that Barrow's Strait, at the time we left, exhibited any ground for hope that the ice would rush out and deliver to us the vessels on which our thoughts were so anxiously bent?

Giving up all further idea here, and impressed with the probability of another severe and early winter, my thoughts led me to seek Port Dundas; not indeed to risk the remains of our Squadron, but to communicate by boat with the natives, and ascertain, if possible, whether they had ever seen the 'Erebus' or 'Terror' sail up or down. Further, I had been given to understand that some one on board the 'Phœnix' had recognized the natives as belonging to the Pond's Bay tribe, and, under my original interest in the story raised by them in 1849, I was most anxious to probe this matter more deeply; and as they had found a purchaser for one of the records

stolen from Cape Warrender, it occurred to me that if they possessed other papers, I might, by the expenditure of some trivial stores, particularly of timber, obtain all that they possessed, and amongst them possibly find some clue to the fate of our missing countrymen. Most certainly I was prepared to go further, and, should their information lead to any inference of unfair measures on the southern coast, adopt, perhaps, very strong measures to completely carry out my duty.

On entering Croker Bay, all these matters received a serious check by the ice having closed in upon the land; and taking into consideration the reports of the ice besetting the mouth of Lancaster Sound, I determined to seek the only outlet which the experience of former Arctic navigators pointed out as likely to be available. Each had experienced a strong current setting easterly along the southern side of the Strait, and the 'Enterprise' had, during an adverse gale blowing up the Strait, been drifted forty miles to windward in twenty-four hours. This fact clearly indicated to my mind the cause of the ice now pressing on the northern coast. It was simply the eddy of that great current, caused, in all probability, by ice abutting about Cape Warrender and extending thence into Baffin's Bay.

I immediately decided on following up the tail of this ice and rounding it. In this decision the Ice-master and others did not coincide with me, it is true; but they had not studied these matters, and had no reasons to give. As we reached the southern edge, I clearly saw indications of an opening; and the Ice-master, at length wavering, hailed from the crow's-nest, "If you intend, Sir,

to take the ice, we may as well try it at once." Such was my decision: I felt certain of success; I even offered a nominal bet that before night we should be clear of ice. So it proved.

I then determined on visiting the depôt at Navy Board Inlet, and running in between the Wollaston Islands, anchored off the place, rather in scant water. The provisions had been plundered by the natives. The scene of mischief and wanton spoliation could only be appreciated by those who witnessed the remnants of an immense supply of human food, cask-staves, hoops, bags, preserved meat tins, tobacco, flour, boots, and every imaginable necessary for Arctic service. But what appeared to me most extraordinary was the peculiar mode of destruction,—such as preserved meat tins cut longitudinally, and the coal bags even, as they were detached separately from their ice-bound cementation, also treated in a similar manner. It occurred to more than one spectator that there was great *method* in this general destruction, and that each bag must have been cut at the moment it was deposited, or how could the *underlying* bags be so treated? The 'Phœnix' had previously taken on board nearly all the serviceable provision and tobacco; the coal, therefore, being useless to others and important to the service, was embarked, and measures adopted for completing water.

Our detention here, all the vessels having anchored too near the shore, had nearly proved disastrous. A strong breeze set in, they drove, and but for the aid of steam, I much doubt if they would now exist. But the only matter of interest occurred in the attempt to assist

the 'North Star:' she had, on her former visit in 1850, parted her cable, leaving an anchor behind; during the process of aiding her, on parting a second time, on this visit, her warps fouled the *lost anchor*, which was *recovered* and substituted.

Eventually, we succeeded in extricating the vessels, and steered for Pond's Bay, off which, not choosing to incur further risk, I left the sailing vessels, and steamed in to search for natives. After a very diligent inspection, without finding natives or any traces of recent visitors, I examined the watercourse and valley, where the remains of an old village stood. In one of the huts, similar in every respect to those examined by me at Village Point (referred to in page 96, Vol. I.), and evidently constructed by a tribe of similar habits, I found a skull, an English knife, and an iron-tinned spoon, rolled up in a fur and bird-skin dress. These were brought to England; but the skull having been declared by Professor Owen to be that of a female, destroyed any possible connection with our countrymen, notwithstanding appearances about the teeth and gums would otherwise have indicated disease to which civilized beings are more disposed.

The watercourse was unfrozen, and at this period ran in a full clear stream, very convenient for watering, and had moreover at its mouth an artificial dock where a boat could safely lie. One cask-stave with the broad arrow, and several preserved meat tins, denoted either the visit of a vessel of war or the plunder from Navy Board Inlet, with which this creek doubtless communicates by inland navigation.

Steaming out, we rejoined our consorts, and, taking

them in tow, pursued our course southerly, intending, if possible, to make further search about the Clyde and Cape Walsingham; but many powerful reasons prevented. In the first instance, the ice rendered it dangerous whilst hampered by our consorts; their safety was of more importance than any chances where no reasonable hope of success could be advanced. Next, unless I altered the arrangements, removed the officers, and took the separate command of the 'Phœnix,' sending the remainder home, I could not satisfactorily pursue the course I contemplated. Eventually, the 'Phœnix' met with an accident, which destroyed all further confidence in her powers, by uncoupling her screw-shaft, bending it, and rendering her further services for a time doubtful. In addition to this, her supply of coal had not yet been removed from the 'Talbot,' and could only be effected in some safe harbour. A dog driver from Upernavik was yet on board, and forty-five tons of coal were also deposited at Lievely; but for these latter points, nothing would have induced me to visit Lievely, but that port I now decided to seek.

We were fortunate enough to thread the middle ice without difficulty, even with our consorts in tow; which fact clearly proves, to my mind, that the visit to Beechey Island can be made safely, and more expeditiously, by adopting our homeward track, in the latter part of August, than by the doubtful, dangerous, and troublesome mode of proceeding by Melville Bay. No vessel, to my knowledge, has yet failed to reach England from Lancaster Sound in September, but we know the very doubtful success attending the course by Melville Bay.

As we neared Greenland the increasing breeze rendered it necessary to cast off the tow-lines and proceed independently. The 'Phœnix' reached Lievely on the 6th of September, about four A.M., where we were welcomed by the authorities with the customary attentions so repeatedly noticed by the several officers commanding these Expeditions.

As the provisions withdrawn from Navy Board Inlet were likely to prove a nuisance on any rise of temperature, and would be objected to by our seamen, and learning from the Inspector that many Greenland families at some of the settlements had perished last season from hunger, I directed a portion to be landed for the use of these distressed people, who would deem the provision we should condemn as unfit for consumption a perfect luxury.

On our being rejoined by the 'Talbot,' and shipping her coal, we quitted Lievely, not however without incurring further dangers, which were fortunately avoided by the knowledge we had obtained from our former survey of this port. The dangers, difficulties, and other disagreeables attending these visits, determined me not to incur further responsibility or delay by touching at any other ports of Greenland. I therefore directed the sailing vessels, in the event of parting company, to repair to England and report themselves, according to the practice of the service, on arrival.

The equinoctial gales determined me to seek Cork, in order to replenish coal, and to repair with the utmost expedition to the Admiralty. On the morning of the 28th of September we sighted the port. Here another failure

of the engines tantalized us for a short period; but I had just determined on proceeding in my gig, when they resumed their work; and about nine A.M. I had the satisfaction of paying my respects to Rear-Admiral Sir W. F. Carroll, the Commander-in-Chief, and shortly after noon, accompanied by Captain Kellett and M'Clure, proceeded by rail for London.

I should not have deemed it of sufficient importance to myself, as regards my professional character at the Admiralty, and more particularly in the opinion of those who selected me for command, and are satisfied that I did not err in the true intent of my obligation in the completion of its duties,—but it is due to the unprofessional part of the public, to notice what I perhaps was too careless of making any display of, at the subsequent formal investigation, as to the obedience to my Instructions from my Lords Commissioners of the Admiralty, in the withdrawal of my crews.

It has been imagined by unprofessional readers that I was, in some degree, hampered by some implied order to be guided by those serving under me, and that any difference of opinion was to serve for damage to me, or *quasi*-exaltation of those who might by chance prove to have made a better guess on probabilities.

But no man in his senses, or who knew my professional course over an independent career of twenty-four years, and readily assuming the responsibility of far greater powers, would believe in such absurdity, or that I would have retained command under such degradation.

Nor am I entering now upon any defence, for the judicious termination of my command has never been called

in question; I mean therefore simply to observe on the early, as well as final resolve, to withdraw the crews,—to use a recorded expression,—"and when you judged you thought all had been done which could be done for the attainment of these objects, you were not to linger out, but to bring your crews home;" and further, "when you judged you could do no more, would have the courage to act on your judgment, and to return home."

Simply, then, I stood with a recorded guarantee before the country, that the issue of the search was vested in me, and that with me it was to terminate. Assuredly I was not to linger out, and thus, by accumulating expense, to render it interminable; nor yet by oscillating conduct as regarded the vessels, for that matter was fully understood before sailing, or further to jeopardize the crews when I formed an opinion they should be withdrawn, merely to serve the feelings of any men, required to desert these purchased masses of timber, when I thought such a step desirable, for really the pendant flew *merely to ensure martial law*,—they were not portions of our Navy beyond this emblem, and the discipline which it entailed.

## CHAPTER VIII.

Import of Instructions.—Further Search impossible.—Leaving the 'Talbot.'—Dr. Rae's Information.—Finds undeniable Traces.—Dissection of Report.—State of the Bodies.—The Quantity of Relics.—List of Articles found.—Opinion on the Information.—Impressions of 1850-1852.—Official Letter.—Captain Collinson's Discoveries.—Opinion on the North-west Passage.—Rewards due for Discovery.

I COME therefore simply to the Instructions. What were they founded on? The report of a Committee on the proceedings of my predecessor, and in that document the following occurs (paragraph 16):—"If, on the other hand, Wellington Strait is found open and navigable on the arrival of the Expedition, in the summer of 1852, we think one of the sailing ships, with a steamer, might proceed at once to take advantage of this opportunity, if the officer commanding should judge such a measure safe and prudent, and be thus placed in winter quarters in a more favourable position for commencing the land search in the spring of 1853, but with the most strict injunctions not to advance to such a distance as to endanger their return to the depôt, or their communication with it *that year;* and it should be enjoined with equal strictness, that, in the event of any irreparable disaster to

the ships so proceeding, or *if they should be too firmly fixed in the ice to be extricated during the summer of* 1853, *they are to be abandoned, and the crews brought down to the depôt.*"

With this opinion of the Committee, their Lordships determine on the Expedition, which I was appointed to command. About eighty days intervened for explanation, and my Instructions contain the consolidation thereof. (*Vide* Vol. I. p. 1 *et seq.*)

Paragraph 2 does not indicate any reference to secondary opinion, but distinctly defines the confidence entrusted to me.

At paragraph 4 the extract of the report of the Committee is alluded to:—"The plan of future operations there proposed is to be considered as the basis of your operations."

At paragraphs 10 and 11 it is distinctly intimated that my Instructions to the officer despatched to Beechey Island are to be stringent—to be in accordance with my *obligations*, referred to in paragraph 2, and even to admit of his return to England in 1852!

At paragraph 15 the intention conveyed by their Lordships is not, that, in case of my absence, the officer who succeeds may proceed as he pleases; but, in conformity with my *obligations*, he shall carry out faithfully the mission confided to me until I resume the command.

The 20th and final paragraph distinctly commands the return, on the question of provision, in the summer of 1854.

The orders of 1853 do not vary in any manner from

the preceding; but should the question of *further search* be entertained, certain means of sustenance are forwarded.

At paragraph 2 of these second Instructions, it is clearly intimated that having done all that could be done in the matter of *search*, the Expedition was to be abandoned. And if such likewise should be my opinion, after mature consideration with the Senior Officers under my command, I was to abandon.

This simply refers to my opinion formed, *after consultation with all the officers* in whom I placed confidence, as to *further search*. But that decisive opinion had been given *before* I asked for it.

But it is not for me to state on whom I confided, or what were the opinions. It is universally conceded that "all had been done that could be done." As the Commander of that Expedition, I was in communication with all: I knew their secret feelings, and on those feelings I acted, on my own responsibility, without insulting any one for obtrusive advice. I did not leave any one to suffer for my decision; but boldly, and as I had the temerity to believe, generously, putting my neck into the halter, issued my orders in my proper province, as it was expected I would do by those who confided in my courage to face any difficulty which looked me in face. Had I been weak enough to yield, and disaster had ensued, where would my character now be? It requires no prophet to conclude how I should have been dealt with.

At paragraph 3 full confidence is renewed, and to that confidence I have responded by the determined act which,

I trust, has met with the approval of every man of courage or of common sense,—and of which I bear *written evidence from competent authority*, as well as from the highest ornaments of both professions, in language too strong to allow of insertion here.

But as regards any volunteer to remain out, that was my province to decide. I could not so far forget my duty, as the chief, to allow any one to creep between me and danger.

If the 'Resolute' and tender remained, it must be clear to professional minds that the chief must also remain at Beechey Island until the next season.

All this I foresaw in October, 1853, and the confusion which would involve any hesitation on my part.

And what is the result of my judgment? The 'Resolute' is as safe where she is, as if she had been moored for ever at Melville Island. Would any one dream of her extrication, if she had, in obedience to my original order, been abandoned there?

It is almost unnecessary to revert to my final Instructions, as they reached after I had quitted and had taken my measures; but they incontestably prove *the propriety of my decision*, and that all my grounds for action were *well founded*. As to *further search*, that never could be contemplated by any reasonable individual who had the interest of his country at heart, or who was entrusted with plenary powers, if he thought there was any reasonable direction in which they could be exercised.

As regards the 'Resolute,' I knew enough to enable me to decide, and events have proved my decision judicious. I knew the difficulties of 1850 to 1853. I had

certain proof that, after the ice broke up, no man or boat could travel over such an expanse of loose pack as intervened between the 'Resolute' and the land, and therefore, that she must remain to the chances of release in September, or later;—with what probability of success, the ice which bound Leopold Island on the 27th of August will best satisfy Arctic navigators, especially when they *know* that the *first winter warning* had been demonstrated in Wellington Channel, and that to the imaginations of some, who perhaps talk most of these matters, it was endeavoured to excite my apprehension that we should not clear Lancaster Sound or Baffin's Bay that season.

Another yet more important question has not been raised, and for this simple reason,—I required no excuse for obedience to the *known intent* of my Instructions. I did not call for the evidence of the *highest authorities* to raise a doubt before a military tribunal as to their *powers*, and the Investigation was merely what I was instructed to consider as "compliance with the custom of the Service."

But with the public, which may be misled by the assumption that one of the vessels could have been left as a depôt at Beechey Island, I will venture to remark,—that officers who have been long accustomed to command independently, know full well all the difficulties they must be prepared to encounter, and they too often discover that men who volunteer *headlong* never give to the world the insuperable difficulties which *they know* must render any accordance to their wishes impossible, and entailing on the Commander of an Expedition alone all the censure of *accordance to their volunteer*.

In the case before us, I will imagine that I had decided on leaving out the 'Talbot' with a *reduced crew.* Such a measure inevitably entailed on me *delay* until she was cut in, and, *to my judgment,* safely placed for the winter. I set aside the bugbears raised, as to the asserted difficulties in clearing Lancaster Sound; but be it remembered that the safety of the 'North Star,' in 1852 to 1854, in that position, was determined by others, and fully acknowledged by me, *to be doubtful or dangerous;* that in the winter of 1852 this was proved to be fearfully *true;* moreover, that, aided by the Squadron force of 176 men, she only reached the water on the 21st of August!

What opinion, then, would be formed of my judgment, or of the fulfiment of the pledge under which I sailed? That I did not err in its conception, I give the words themselves, expressing full approbation of my views.

"You were sent out in the last hope (if hope it could be called) of saving Sir John Franklin and his companions; to discover some traces of their fate; to meet and aid, so far as possible, the Expeditions of Captains Collinson and M'Clure; and when you thought all had been done which could be done for the attainment of these objects, you were not to linger, but to bring your crews home.

"I selected you because I thought you had energy to do what could be done; next, judgment to come to a proper decision; and, when you judged you could do no more, would have the courage to act on your judgment, and to return home.

"As far as I am informed, I have been satisfied with your conduct on all these important points."

Under such clear Instructions as I held on sailing, clearly intimating, without question, that I was not to hesitate in giving the *most positive* and *unmistakable* instructions to those under my command, and that I was to keep the principal officers apprised of *my views and intentions*, it is as clearly intimated that those views and intentions were to be adopted, and carried out, by those under my command, should misfortune occur to me.

For what reasonable purpose then, I would inquire, was it proposed to risk another vessel, and to add her to the list of losses, incurring the heavy expenditure of double pay and provision; the officers and men idly spending a winter, and imagining how they were to be engaged when spring travel became possible? But here again glaring inconsistency stares us in the face!

Let it be imagined that the Government warranted, even approved of, such an inconsiderate determination, where would the crews be? Certainly not engaged in any act to relieve and extricate their own vessel in August, 1855 (if such a winter warranted any such hope), but probably searching for traces of the 'Resolute' and 'Assistance,' for fame sake! and, granting every facility of 1853–54, should any impetuous, uncontrollable mind determine to abide by either of those vessels after the middle of August, what would be the course left to the officer commanding the relieving vessel, if *one sledge crew*, or even *one man*, was absent?

Finally: I do feel infinite gratification that it pleased God to afford me determination to perform my duty in the precise manner I did, under the circumstances and difficulties by which I found myself surrounded; and

that since my return to this country I have had the satisfaction of learning that I did all that was expected of me by those whose written opinions are as orders; and further, by letters from the highest ranks in both professions, which satisfy my mind that the cold of the Arctic regions has not influenced their estimate of my character for clear judgment in the performance of my duty.

It now remains, as a matter of record, to observe on the termination of the naval Arctic Search by this country. I anticipated the return of Dr. Rae, with intelligence of Captain Collinson, and after that, of the escape of Captain Collinson by the way he came. Both have been safely restored to this country. The accounts are before the world, but I may be pardoned for introducing a few remarks on their operations, as the conclusion of the Government search.

Dr. Rae, in his journey, with the intent of completing the survey of the west coast of Boothia, met with some natives in Pelly Bay, from one of whom he learned that a party of white men had perished for want of food some distance to the westward, and not far beyond a large river, containing many falls and rapids. The record of Dr. Rae runs:—

"In the spring of 1850 a party of white men, amounting to about forty, were seen by some Esquimaux, killing seals near the north shore of King William's Land (1), travelling southward over the ice, and dragging a boat with them (2). None of the party could speak the Esquimaux language intelligibly, but by signs the natives understood that their vessels had been crushed by the

ice, and that they were going (3) to where they expected to find deer to shoot.

"From the appearance of the men, all of whom, except one officer, looked thin (4), they were supposed to be getting short of provisions, and they purchased a small seal from the natives.

"At a later date the same season, but previous to the breaking up of the ice, the bodies of some thirty persons were discovered on the *continent*, and five on an island *near it*, about a long day's journey to the north-west of a large stream, which Dr. Rae considers to be no other than Back's Great Fish River. Some of the bodies had been buried, some were in a tent or tents, others under the boat, which had been turned over to form a shelter, and several lay about in different directions (5). Of those found on the island, one was supposed to have been an officer, as he had a telescope strapped over his shoulders, and his double-barrelled gun lay underneath him.

"From the mutilated state of many of the corpses and the contents of the kettles (6), it is evident that our wretched countrymen had been driven to the last resource—cannibalism—as a means of prolonging existence.

"The ammunition had not failed, as it was turned out by the natives, and a quantity of *ball* and *shot* was found below *high-water mark* (7), having probably been left on the ice close to the beach.

"There must have been a *number of watches, compasses, telescopes,* guns (several double-barrelled), etc. (8), all of which appear to have been broken up, as he saw pieces of these different articles with the Esquimaux,

and, together with some silver spoons and forks, purchased as many as he could get.

"None of the Esquimaux with whom he conversed had *seen* the *white people* (9), nor had they been at the place where the bodies were found, but had their information from those who had been there, and who had seen the party *when travelling.*"

Until I had copied the above, I did not comprehend how much I had to object to; but Dr. Rae will not, I am sure, be offended at my dissecting, not *his statement*, but the evidence on which it has been founded, and which now forcibly brings to my mind my opinion, furnished to their Lordships on his arrival, and my views as to what was the course taken by the parties after their undoubted wreck.

I shall therefore take my queries in number, commencing with No. 1. King William's Land will be found on the chart near the latitude 69° N., longitude 96° W., therefore the party might have travelled through the neck termed Bellot Strait, and their vessels might have been crushed anywhere on the limit of Sir James Ross's southern search. This would agree with my original views,—that they were seen in 1849 by the natives, as reported.

No. 2. None of the party, to my comprehension, spoke Esquimaux; therefore I infer that Sir J. Franklin, and Mr. Osmer who served in the 'Blossom,' were not of the party; and yet

No. 3 argues, to my impression, a great power of communicating ideas,—"they were going to shoot where they expected to find deer."

No. 4. The officer who was not *thin* would not, I think, sufficiently represent Sir J. Franklin; his peculiar features and forehead would have been remarked. Famine will reduce aged men more rapidly than powerful young men; but why should not all the individuals be thin, if so short of provision at the date in question?

No. 5. The account of the bodies found does not satisfy my mind. It is not in the nature of that race to permit any persons to pass *untracked* until they reach an adverse tribe. They *would, and did,* most assuredly follow them; or why, by mere chance, as it is intended to convey, did they so soon afterwards, *and after so short travel,* learn their *fate?*

"Some had been buried, some were in tents, others under the boat, several lay about in different directions." This was not *late* in the season, but *before the ice broke up;* but it is clear that they were perfectly cognizant of more *after the ice broke up,* for they intimate that the shot and ball deposited on the ice had, when the ice thawed, sunk below *high-water mark!!*

On the island one, supposed to be an officer, had his telescope strapped over his shoulder and his fowling-piece beneath him. This must have been from positive vision, not from information.

No. 6. From the mutilated state of the bodies, and the contents of the kettles, a fearful resort is intimated.

In this I cannot rationally coincide. If such had been the deliberate act of *starving men,* no vestiges would have been found in *the kettles.* As to fuel to cook, we have no evidence; but the boat was there. And it may be some consolation to the friends of officers, until we

hear from the present searching party, to know that by this account he was not one of the victims.

Can all this refer to one hundred miles of coast-line, etc.? No. 4 makes the island *near to the mainland.*

No. 7. A careful consideration of this portion satisfies me that the informants possessed a very intimate knowledge of every matter connected with this one party. They are too circumstantial as to the *seasons, tides,* and *effects,* to have learned their story from *narration.* No! they were intimately conversant, and connected, with the fatal termination of the career of the *entire crews,* which were wrecked not far from the spot where he then stood; and it is *reasonable* to suppose that they wished him to seek in a contrary direction to where the catastrophe occurred for a previously fleeced remnant which could tell no tales!

No. 8. "There must have been *a number of watches, compasses, telescopes, guns,* etc." Now we derive from the informants that *only* forty, one being an officer, who did not drag, were seen; that these forty are found dead in the Great Fish River (clearly they were tracked thither), and that *one telescope and one gun were noticed.* But our nerves are not a little disturbed at this one party having in their possession *all the valuables of the two crews!*

Now taking into consideration my own experience, the companion of my men for nearly forty years, and coupled with the knowledge of my late Arctic service, I confidently ask, Could such a number of watches, guns, or telescopes remain perfect much beyond one season? and would they be found amongst any forty men, one

only being declared an officer? But look to the list annexed. No less than eleven watches are traced, and parts of surgical instruments.

No. 9. Now the informants declare that they had never seen the white men, nor had they been at the place where the bodies were found. And 10, that they only saw the party when travelling!

*List of Articles purchased from the Esquimaux, said to have been found at the place where the party of men died of famine in spring* 1850, *viz.*:—

| | | |
|---|---|---|
| 1 | silver table fork | Crest No. 1. |
| 4 | „ „ do. | „ 2. |
| 1 | „ table spoon | „ 3. |
| 1 | „ „ do. Motto, "*Spero meliora.*" | „ 4. |
| 1 | „ dessert do. | „ 4. |
| 1 | „ table fork | „ 5. |
| 2 | „ „ do. | „ 5. |
| 1 | „ dessert do. | „ 5. |
| 1 | „ table spoon | „ 5. |
| 1 | „ tea „ | „ 5. |
| 1 | „ table fork, with initials | H. D. S. G. |
| 1 | „ „ do. „ | A. M. D. |
| 1 | „ „ do. „ | G. A. M. |
| 1 | „ „ do. „ | J. S. P. |
| 1 | „ dessert spoon „ | J. S. P. |
| 1 | „ „ do. „ | G. G. |
| 1 | „ table spoon „ | I. T. |
| 1 | „ tea do. „ | A. M'D. |
| 1 | „ table fork „ | I. T. |

1 small silver plate, engraved "Sir John Franklin, K.C.H." A star or order, with motto, "Nec aspera terrent," on one side, and on the reverse denoting "Will King."

2 pieces, gold watch-cases.

8 pieces, silver watch-cases, one of these with initials which cannot be clearly deciphered.

1 piece of a watch marked "James Reid."

1 case, pocket chronometer, silver-gilt, and dial.
1 small silver pencil-case.
1 piece, silver tube; part of a catheter, I believe. (J. R.)
1 piece, some optical instrument.
1 old gold cap-band.
1 surgeon's scalpel.
Several sovereigns (two), shillings (four), and half-crowns (two).
2 pieces (about seven inches), gold watch-chain.
2 leaves of the Student's Manual.
1 surgeon's knife.
2 common knives.
1 woman's knife, or cobbler's.
1 pocket compass box.
1 ivory handle of table-knife, marked "Hickey."
1 small narrow tin case, marked "Fowler." (?)
1 do. do. no top, marked "W. M."
Sundry other articles of little consequence.
1 piece of flannel under-vest, marked F. D. V. 1845.
1 albata plate table-spoon.

I have, etc.
(Signed) JOHN RAE, C.F.
Commanding Arctic Expedition.

*Repulse Bay, July*, 1854.

No man can for an instant imagine that the statements so very distinctly given by Dr. Rae are other than the result of his opinion, founded on his most anxious and untiring efforts to arrive at the truth. But I can clearly imagine that his anxiety to render the questions of his interpreter pertinent has led him to afford the wily Esquimaux a view of his purpose; and they, fearing punishment, have endeavoured to misdirect him from the true position where the disaster occurred.

Where the collective treasure of those two vessels was found, there these same Esquimaux had been. But where the forty bodies may be discovered is, I fear, remote from the *proper place for search;* the fear of

detection may possibly thwart our endeavours, but some written evidence, I trust, may yet clear up the mystery.

Something more than bare opinion will be required for so far interfering with the convictions of Dr. Rae. But I have for quite as long a series of years been conversant with great detail of preparation for every kind of service. I know the difficulties of ice-travel, and I am now more conversant with the disposition and ability of men, under our latest improvements, to drag *useless weights*. I know the *probable difficulties* of ice disasters; and when I clearly perceive *method, cool calculation*, and the *preservation of such valuables*, I am impressed with the *conviction* that adequate provision for very extended travel was provided, and that before they became reduced every ounce of *lumber* would have been cast away. Nor in such an estimate, believing in the powers of the men engaged, am I prepared to concede that the scene of disaster can be more distant than two hundred miles from the position where the bodies are said to be.

With this distance, or three degrees of latitude (70° to 73°) in the compasses, they will be found within that radius, to my conviction within Prince Regent's Inlet, and such an opinion was hazarded *before I left this country*. But with the radius of three degrees, 72° to 75°, equidistant from Cape Riley—from the spot where the bodies are said to be—and Igloolik, where I imagine one division has gone, will intersect the spot where I have imagined the disaster occurred. In a letter of the 27th of October and another of the 9th of November, I suggested the following:—

"1. That Sir J. Franklin met with disaster to the east-

ward of the meridian of Beechey Island, and that the traces found at Cape Riley were those of one division of the distressed crews.

"2. That I never doubted the truth of the reports of the Esquimaux of Pond's Bay, in 1849, that two ships were seen on the eastern side of Prince Regent's Inlet, and that those two vessels were the 'Erebus' and 'Terror.' At that period I myself examined the master of the vessel which brought the report.

"That the tribes which then visited Pond's Bay find their way by inland navigation through Cockburn Island we now have almost indisputable evidence, by the robbery of the depôt at Navy Board Inlet; and their crossing to Port Dundas, on the north side of Lancaster Strait, is particularly suspicious.

"If the 'Erebus' and 'Terror' were blown out of Beechey Island Bay (as the only mode of clearing the ice), they might have got *within the current*, and been driven down Prince Regent's Inlet, and on the eastern side.

"And being wrecked well down this inlet, they would divide into three parties, one for Beechey Island, one for Pond's Bay, and the last, headed probably by Sir J. Franklin, for the Hudson's Bay posts. I reserve the small number for Sir John, because his experience would teach him the impossibility of subsisting any large number of men, even if they reached a post safely.

"The sails cut up, leaving the bolt-ropes at Cape Riley, are, to my mind, having been twice wrecked, undeniable proofs of the substitution of canvas for shoes; and the rake as clearly indicates its employment in collecting

edible seaweed (dulse), which abounds there, and which I freely used at Port Refuge in August, 1853. These ideas are long since recorded.

"Of the eastern party, I firmly believe that some may have reached Igloolik, where Sir Edward Parry wintered, and have attempted to reach Pond's Bay by the spring following.

"But here a difficulty meets me, which is somewhat suspicious. The Pond's Bay tribe do not seem to have communicated with our whalers from the date of that eventful period, 1849; and yet evidence of a *late visit* was proved by my visit in September last, when I found remains of *recent blubber!*

"In one of the old huts I found a skull, a European knife and tinned spoon, enveloped in seal- and bird-skin dresses; and it is rather a strange coincidence that the fitting of the knife to Esquimaux use is similar to one brought home by Dr. Rae.

"It is still my firm conviction that the most reliable search would be from Captain Penny's position in Northumberland Inlet (Kemesok); from whence a communication might be effected with the several tribes, and more satisfactory evidence discovered."

Such was my communication: nor was this merely the result of Dr. Rae's report, as this narrative, unaltered from its original tenour, will evince. Had the Squadron been released in 1853, four distinct positions would have been occupied between Navy Board Inlet and Kemesok, and the eastern questions satisfactorily determined.

As regards the last vessels of the searching Expeditions, Captain Collinson's despatches indicate that he

pursued the same course as Captain M'Clure, through Prince of Wales' Strait, and that one of his officers landed on Melville Island, being thus the second, by sledge travel, in effecting the discovery of an ice-covered sea, preventing the complete navigation to where Parry had already proved it to be navigable.

He had prosecuted successfully his researches, until he also crossed those of Dr. Rae, and at length, having extricated the 'Plover' and his own ship, reached Hongkong and England, without leaving a living soul behind to distract the feelings of our countrymen.

On the question of the "North-west Passage," which was totally excluded by all the Instructions to those engaged on this Arctic search, I may be permitted, as one totally unconnected with those contending for the credit of its execution, to express my opinion.

The original Act was to reward any persons who by *sailing* from sea to sea proved America to be an island; and at the period the reward was offered, it was considered (I speak subject to correction), by the wording of applications to the Treasury, with the assertion, "that great benefit would arise to *commerce*." Now, when Sir Edward Parry made good his claim, it was for the completion of *a portion* between the meridians undiscovered. The Act then,—by the powers vested, I believe, in the Board of Longitude,—divided the undiscovered spaces into divisional rewards. But inasmuch as Sir John Franklin, Sir John Richardson, Dease and Simpson did not *sail through*, the rewards to which they were *most justly entitled* were *denied*. But to my mind, and to

those who are deemed to possess the clearest views in such matters, it has been considered that the solution of the question (or really that America is sea-washed on its Arctic bounds) would have been incontestably proved had any person passed down Peel's Strait *in open water* and arrived at the positions visited either by Captain Back in former times, or by Dr. Rae on his late journey.

It has therefore been assumed by the friends of Sir John Franklin, that his ship did so pass down Peel's Strait, and was wrecked in a position which would entitle him, if living, to contest this matter. And my own opinion goes to favour those who have, by much more hazardous voyages than those made by Parry or his successors, determined the *commercial interests* which may, in consequence of their discoveries, and probably will, be pursued at some future period along that *sea-washed* shore.

That a *reward* should be given for the *fortunate solution*, I am prepared to support; but that reward should be meted with justice—to the Commander of that Expedition, Captain Collinson. For if we deal with the question on its naval rights, Captain M'Clure loses his initial claim at the moment he sent his Lieutenant to precede him to England, or when he abandoned his vessel.

It has been asked by numerous friends what solution I would give to the vessels reported to be seen off Newfoundland in the winter of 1851–52. I can only treat the question with reference to the 'Erebus' and 'Terror.' Setting aside, therefore, my recorded conviction that those vessels were crushed within Lancaster Sound, I will observe that the 'Erebus' and 'Terror,' if frozen in,

would not be hampered by icebergs, inasmuch as they are not seen within Lancaster Sound, although they may be found at its mouth;—that vessels frozen in, and remaining so at the commencement of spring, would be surrounded by the floe or tabular field-ice;—and that its line of floatation, if it broke away and passed to the southward, would not support vessels more than eighteen inches above the sea-level.

But the temperature of the sea between the mouth of Lancaster Sound and the Great Bank of Newfoundland being always much above the freezing-point, and varying between 50° and 60° southerly of Cape Farewell, it is next to impossible in such a drift, over seventeen hundred miles as the crow flies, that any ice in which those vessels might be sealed in 74° N. could by any reasoning withstand the thaws, as well as sea washing, over such an interval.

But if we assume the vessels to have been driven out of the Sound and frozen in the pack, then, if circumstances for the winter froze them in contact with a berg, undoubtedly the berg would have discarded them early in the spring, and permitted them to float freely; or if attached, most undoubtedly would, by the customary thaw, have placed them so frequently under water at the *periodical rolling* as the under surface thawed, as to leave no traces of vessels after they had once been exposed to such an immersion.

The Orders of the principal Expeditions are annexed, in the Appendix, that the nature of the service required of the successive Commanders may be fully understood.

The remaining part of the Appendix is devoted to subjects of natural philosophy, tabular matter, and natural history; which will, I trust, evince that, notwithstanding the great and absorbing duty committed to my direction, the general pursuit of science has not been disregarded.

# APPENDIX.

## A.

## ORDERS.

### No. IV.*

*Admiralty, February 15th*, 1853.

Sir,

I am commanded by my Lords Commissioners of the Admiralty to signify their direction to you to use your own discretion as to quitting your present quarters after the receipt of this, and endeavouring to secure the 'Plover' for the winter in Grantley Harbour; but should you deem it prudent to remain where you are for the ensuing winter, my Lords desire you will use your utmost endeavours, as soon as the season will permit in 1854, to reach the winter quarters of the 'Rattlesnake' in Grantley Harbour, so as to effect a junction with that ship in time to make the necessary exchanges between the two crews, and receive the needful supplies before the 'Rattlesnake' shall have been compelled to quit Behring Strait, in the autumn of 1854, on her return to this country.

2. In the event of your remaining this winter in Moore Harbour, you are to employ yourself in depositing all the supplies you can spare for the relief of any party that might reach that neighbourhood from Captain Collinson's or Commander M'Clure's ship. You will also extend your parties right and left along the shore, and in such direction as may be advisable, as far as may be prudent, in order to deposit notices of your proceedings and intentions, and of the store of supplies left at Moore Harbour.

3. Before quitting Moore Harbour you will erect such house or place of shelter for any arriving party as your means will permit; and even if you should be unable to move the 'Plover' round to Grantley Harbour, you and your people are, at all events, to make good your retreat to the quarters to be provided in that harbour by Commander Trollope.

* For the Orders Nos. I., II., and III., see Vol. I. p. 1 *et seq.*

4. For directions as to the course to be adopted in depositing notices of your intentions, and of the supplies left in Moore Harbour, their Lordships refer you to their instructions to Sir Edward Belcher, and to the further remarks on that subject contained in Sir Edward Belcher's letter to the Secretary of the Admiralty, of the 29th May last, from Whalefish Islands.

I am, Sir,

Your most obedient servant,

W. A. B. HAMILTON.

*Commander* MAGUIRE,
*H.M. Discovery Ship Plover,*
*Moore Harbour, Point Barrow,*
*or to any Officers of the 'Plover,' at Cape Lisburne.*

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No. V.

*By the Commissioners for Executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland, etc.*

Whereas it is necessary to replenish Her Majesty's sloop Plover, now in position at Point Barrow, Behring Strait, with stores and provisions, as well for the future supply of that vessel as for the purpose of meeting the wants of the crews of the 'Enterprise' and 'Investigator,' should those ships be driven back upon Behring Strait, or should circumstances have rendered it imperatively necessary for the crews to abandon them, a course stated by Commander M'Clure (in a letter, dated 20th July, 1850, to Captain Kellet) "he might be compelled to adopt after the winter of 1852, by proceeding in the spring of 1853 to quit his vessel with sledges and boats, and make the best of his way to Ponds' Bay, Leopold Harbour, the Mackenzie River, or for whalers, according to circumstances."

With the view, therefore, of conveying assistance to the ships at Behring Strait, we have appropriated the 'Rattlesnake' for this service, and we have appointed you to the command of that ship, with a full reliance on your acquaintance with all that is necessary for carrying out the same, and on your personal knowledge of the coast on which you are to be employed. In furtherance of this object you are hereby required and directed to put to sea so soon as the 'Rattlesnake' shall be in all respects ready, and to use every exertion to be off Cape Lisburne, Behring Strait, at as early a period of this year as possible. In order to aid in this purpose a steamer will be directed to tow you clear of

the Channel; and you will, after watering, if necessary, at Madeira, Teneriffe, or Cape de Verdes, proceed direct to Cape Virgins, on the eastern side of the Strait of Magellan, where a steamer will meet you from Rear-Admiral Henderson's squadron, and will tow you through the Straits, and as much further on your voyage as circumstances will admit. You will then proceed to Valparaiso and replenish with provisions and other stores, and from thence continue your voyage to Honolulu, in the Sandwich Islands; and, having taken on board whatever may be required, especially potatoes, and other vegetables for your own ship, as well as the 'Plover,' you will, without any unnecessary delay at that port, proceed direct for Clarence Harbour, in order to ascertain if any party or later intelligence from the 'Plover' shall have arrived there; and, failing this, you will use your best endeavours to proceed with the 'Rattlesnake' to Cape Lisburne, where you will probably meet with the officer and boat's crew of the 'Plover,' which Commander Maguire, in his letter to the Secretary of the Admiralty, No. 38, of the 20th August last, states will be at that point on the 15th July, 1853.

You will deliver to this officer the accompanying despatch for Commander Maguire, and of which you have a copy, together with a copy of your own orders, and supplying him with what his boat can carry and may most desire, making sure of your return with the 'Rattlesnake' to Grantley Harbour, Port Clarence, before the season of 1853 is too far advanced.

Your ship is in all respects fitted and provided for the service upon which you are employed, and you are well acquainted with all that is necessary on such occasions for the health of those under your orders and for the security of Her Majesty's ship. You will employ your people, as far as is practicable, in the winter months, in the preparations necessary for every operation in the spring, or so soon as the opening of the ice will admit of carrying supplies to Commander Maguire, or to other points, as circumstances may determine.

You will take every means of leaving proper records of your condition and intended proceedings, and of the positions where you may have deposited provisions, taking as your guide for the distinctive mark of such records the instructions contained in par. 7 of our orders to Sir E. Belcher, and Sir E. Belcher's direction in his letter to the Lords of the Admiralty of 29th May, 1852, in furtherance of these orders. You will also convey every information to us by the whale ships which pass through the Strait on their return to the respective countries to which they belong. You are not to confine your communications to

one ship alone, but by every opportunity to keep us informed of every circumstance connected with your own ship, and also the 'Plover.'

In the summer of 1854 a vessel will be despatched from the Pacific Squadron to communicate with Clarence Harbour at as early a period as possible, and by that means you will receive instructions as to your future proceedings, which may depend on the information which may reach England from Sir Edward Belcher or from the western coast. But should, from any unforeseen circumstance, no vessel be able to reach Clarence Harbour, it is our wish that before the close of the season of 1854 you should deposit your spare provisions and stores, with a boat, at your winter quarters, and then proceed to Honolulu, and there wait our further orders; and, in anticipation of such departure, it would appear to be necessary that, during the winter of 1853 and spring of 1854, you should construct a house at Clarence Harbour capable of containing about seventy persons, and made as complete as circumstances will admit, for the shelter of any of Captain Collinson's Expedition, should they have left their ships either in boats or by land, and fall back upon that place.

It will be advisable, in the spring of 1854, to forward travelling parties towards the northern shore, for the purpose of inquiring whether anything can be traced of Captain Collinson's party, or of any men from the 'Plover;' and as you will receive considerable assistance in this object from the Indians, whose settlements are in the vicinity of your winter quarters, you are to cultivate their good feelings by every means in your power, and to take care that no cause of offence be given to them, and for all supplies of provisions which their hunting parties may procure you are always to pay in a liberal and proper manner.

You are supplied with all documents and papers connected with the various Polar Searches; and, in closing these orders, we have to express our confidence in your ability, and to leave you to act in such manner as will best fulfil our intentions.

Given under our hands this 9th February, 1853.

(Signed) J. R. G. Graham,
Hyde Parker,
M. F. F. Berkeley.

*To* Henry Trollope, Esq.,
*Commander of H.M.S. Rattlesnake,*
*at Portsmouth.*

By Command of their Lordships,
W. A. B. Hamilton.

## No. VI.

*A Copy of the Orders from the Lords Commissioners of the Admiralty, under which Captain Sir James Clark Ross, R.N., has proceeded on an Expedition in search of Captain Sir John Franklin, R.N.*

*By the Commissioners for Executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland, etc.*

Whereas the period for which Her Majesty's ships Erebus and Terror were victualled will terminate at the end of this summer; and whereas no tidings whatever of the proceedings of either of those ships have reached us since their first entry into Lancaster Sound, in the year 1845, and there being, therefore, reason to apprehend that they have been blocked up by immovable ice, and that they may soon be exposed to suffer great privation; we have deemed it proper to defer no longer the endeavour to afford them adequate relief. Having, therefore, caused to be prepared and duly equipped with extra stores and provisions, two suitable vessels, and having had them properly fortified, so as to resist the pressure of the ice, and having the fullest confidence in the skill and experience that you have acquired in those inclement seas, we have thought proper to place them under your command; and you are hereby required and directed, so soon as they are in all respects ready for sea, to proceed in the 'Enterprise,' under your immediate command, and taking the 'Investigator' (Captain Bird) under your orders, without delay to Lancaster Sound. In your progress through that inlet to the westward, you will carefully search both its shores, as well as those of Barrow Straits, for any notices that may have been deposited there, and for any casual indications of their having been visited by either of Sir John Franklin's ships.

Should your early arrival there, or the fortunately protracted openness of the season, admit of your at once extending a similar examination to the shores of the Wellington Channel, it will leave you at greater liberty to devote yourself more fully afterwards to your researches to the westward. The several intervals of coast that appear in our charts to lie between Capes Clarence and Walker, must next be carefully explored; and as each of your vessels have been furnished with a launch fitted with a small engine and screw, capable of propelling it between four and five knots, we trust by their means, or by the ships' boats, all those preliminary researches may be completed during the present season, and consequently before it may be necessary to secure the ships in

safety previous to the approaching winter. As that winter may possibly prove to be so severe as to seal up the western end of that extensive inlet, and as it would be unwise to allow both vessels to be beset there, we consider that it would be prudent to look out for a fit and safe port near Cape Rennell, and in that neighbourhood to secure the 'Investigator' for the ensuing winter. From that position a considerable extent of coast may be explored on foot, and in the following spring detached parties may be sent across the ice by Captain Bird, in order to look thoroughly into the creeks along the western coast of Boothia, and even as far as Cape Nicolai; while another party may proceed to the southward, and ascertain whether the blank space shown there in our charts consists of an open sea, through which Sir John Franklin may have passed, or, on the contrary, of a continuous chain of islands, among which he may be still blocked up. As soon as the returning summer shall have opened a passage between the land and the main body of the ice, this eastern vessel is to detach her steam-launch to Lancaster Sound, in order to meet the whale ships which usually visit the western side of Baffin Bay about that time, and by which we purpose to send out further instructions and communications to you, as well as to receive in return an account of your proceedings.

The 'Enterprise' in the meantime will press forward to the westward, and endeavour to reach Winter Harbour in Melville Island, or perhaps, if circumstances should in your judgment render it advisable, to push onward to Banks' Land; but in either case a distinct statement of the measures you are going to adopt, as well as of your future intentions, should be deposited in some spot previously communicated to Captain Bird. From this western station you will be able to spread some active parties, and to make some short and useful excursions before the season altogether closes, and still more effective ones in the ensuing spring. One party should then pursue the coast in whatever direction it may seem likely to have been followed by Sir John Franklin, and thus determine the general shape of the western face of Banks' Land. It is then to proceed direct to Cape Bathurst or to Cape Parry on the mainland, at each of which places we have directed Sir J. Richardson to leave provisions for its use; that party will then advance to Fort Good Hope, where they will find directions for continuing their progress up the M'Kenzie River, so as to return to England by the usual route of traders.

Another party will explore the eastern coast of Banks' Land, and from thence make at once for Cape Krusenstern, where, or

at Cape Hearne, a *cache* of pemmican will be placed for Sir John Richardson.

They should communicate immediately with him, according to the agreement which he and you have made, and, placing themselves under his orders, they will assist him in examining the shores of Victoria and Wollaston's Island, and finally return with him to England, by whatever route he may deem advisable. Unable to foresee the variety of circumstances in which you may be placed, or the difficulties with which you may have to contend, and fully relying on the skilfulness of your measures, as well as by the zeal with which you and those under your command will be animated, we direct you to consider the foregoing orders as the general outline only of our desires, and not as intended too rigidly to control your proceedings, especially whenever, after due deliberation, you have become satisfied that the end we have in view may be more certainly accomplished by the substitution of some other course of operations; and if Providence should not be pleased to crown your efforts with success, we leave it to your own judgment when and from whence to return to England, as soon as you are convinced that every means within your reach have been exhausted.

In case of any irreparable accident happening to the 'Enterprise,' you are hereby authorized to take the command of the 'Investigator,' and to make such arrangements for the officers and crews as may be most consonant to the rules of the service, and most conducive to the objects of the Expedition.

If you should happily succeed in meeting with the 'Erebus' afloat, and Sir John Franklin's pendant be flying, you will of course place yourself under his orders; but if you should find that ship blocked up with ice, or otherwise incapable of proceeding, you are hereby authorized and directed to retain the command of the Expedition, and adopt all such measures as may be requisite for the safe removal of her crew, or that of the 'Terror.'

In the event of Great Britain being involved in hostilities with any foreign power during your absence, you are to abstain from the smallest act of aggression towards any vessel belonging to such nation, it being the practice of all civilized countries to consider vessels engaged on service of this kind as exempt from the rules and operations of war. Both vessels under your orders have been furnished with abundance of stores, and with more than a sufficiency of everything that can in any wise contribute to the welfare of their crews; and we especially direct you to consider their safety, health, and comfort as predominant in

every operation that you undertake. Each of them has likewise been supplied with numerous instruments for the purpose of making geographic, hydrographic, magnetic, and atmospheric observations in those northern and rarely visited regions of the globe; and we annex hereto a copy of the instructions given to Sir J. Franklin, in order that you may pursue a similar course; and though we estimate any such observations as of inferior importance to the one leading object of the Expedition, you will, nevertheless, omit no opportunity of rendering it as contributive to scientific acquisition as to the performance of the great duties of national humanity. In carrying out the above orders, you will avail yourself of every practical occasion of acquainting our Secretary with every step of your progress, as well with your future intentions; and on your reaching England you will call on every person in both vessels to deliver up to you all their logs, journals, charts, and drawings, but which, they may be informed, shall be returned to them in due time.

Given under our hands this 9th day of May, 1848,

(Signed) AUCKLAND,
J. W. D. DUNDAS.

*To* SIR JAS. C. ROSS,
*Captain of Her Majesty's Ship Enterprise,*
*Greenhithe.*

By Command of their Lordships,
(Signed) H. G. WARD.

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No. VII.

*Sailing Orders for Captain Collinson, of H.M.S. Enterprise.*

*By the Commissioners for Executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.*

1. Whereas the efforts that have been made during the last two years to relieve the 'Erebus' and 'Terror' have failed, and all access to the Parry Islands has been prevented by the accumulation of ice in the upper part of Barrow Straits; and whereas it is possible that the same severity of weather may not prevail at the same time in both the eastern and western entrances to the Arctic Sea, we have now determined, in a matter of such moment, to send an Expedition into the Polar Sea from the westward; and having a full confidence in your zeal and skill,

we have thought proper to appoint you to the command of Her Majesty's ship Enterprise, and also to place under your orders Her Majesty's ship Investigator, both of which vessels having been duly fortified against collision with the ice, equipped for the Polar climate by warm-air apparatus, and furnished with provisions for three years, as well as a large supply of extra stores. You are now required and directed, so soon as they are in all respects ready for sea, to proceed to make the best of your way to Cape Virgins, in order to arrive at Behring's Straits in July.

2. At Cape Virgins, the Commander-in-Chief in the Pacific has been desired to have a steam-vessel waiting for you, and by her you will be towed through the Straits of Magellan, and the Wellington Channel, and on to Valparaiso.

3. At that port you will use the utmost dispatch in watering and refreshing your crews, and in fully replenishing your bread and other provisions and stores; and having so done, you will again use your best exertions to press forward to the Sandwich Islands.

4. There is only a bare possibility of your reaching those islands in time to meet Her Majesty's ship Herald, under the command of Captain Henry Kellett; but if that should be the case, you will receive from him, not only every assistance, but much useful information touching your passage to the Strait, and your further proceedings to the northward. It is still more improbable that Her Majesty's ship Plover should be there; but wherever you may fall in with her, you are hereby directed to take her and Commander Moore under your orders.

5. At the Sandwich Islands you will find additional orders from us for your guidance, which we propose to forward from hence by the Panama mail of next March; but if none should arrive, or if they do not in any way modify these directions, you will enforce the greatest diligence in re-victualling your two vessels, in procuring, if possible, the necessary Esquimaux interpreters, and in making all requisite preparations for at once proceeding to Behring's Straits, in order to reach the ice before the 1st of August.

6. An examination of the several orders issued to Captain Kellett will show that it is uncertain where he may be fallen in with. You may probably find the 'Herald' and 'Plover' together.

7. We consider it essential that after entering the ice there should be a depôt, or point of succour, for any party to fall back upon. For this purpose the 'Plover' is to be secured in the most favourable quar-

ter, as far in advance as can be found—such as Wainwright's Inlet, or the Creek at Hope Point; but if they be unsafe, and none has been discovered nearer to Barrow's Point, then at Chamisso Island, or any part of Kotzebue Sound which may afford the necessary shelter.

8. Considering, however, the nature of the service in which the 'Plover' will already have been employed, and that a portion of her crew may be unfit to contend with the rigours of a further stay in those latitudes, you will call for volunteers from that ship, and from the 'Herald' if in company, sufficient to form a crew for the 'Plover;' taking care that the men to be selected are men of good character, and that they do not exceed in number what is actually required for the care of the ship and for defence and security against any treacherous attack on the part of the natives of Norton Sound.

9. The petty officers' ratings that may be vacated by men invalided are to be filled up by men volunteering to remain. Such volunteers are to be subjected to a strict and careful survey by the medical officers of the several ships, and those only are to be retained who would seem to be in all respects fit to encounter this extended service; and the remainder necessary to complete the crew is to be made up from the 'Enterprise' and 'Investigator.'

10. Such crew having been formed (to continue under the command of Commander Moore, and with the officers now in the 'Plover,' or with those who may volunteer for the service), the 'Plover,' if the 'Herald' should be in company, is to be filled up by Captain Kellett with all the provisions, fuel, and stores that can possibly be spared by Captain Kellett, who will bear in mind, not only what may be required for the use of the 'Plover's' crew until the autumn of 1853, and the contingency of parties arriving on board from Sir John Franklin's Expedition, but also the possibility of any party from the 'Enterprise' or 'Investigator' having to fall back upon the 'Plover.'

11. In providing for this necessary equipment for the 'Plover,' attention will be paid to the numbers left in the 'Herald,' and the supplies necessary to carry that vessel to Whoahoo; and having received from Captain Kellett any baidars, or light boats, that he may be able to spare, and which may be likely to form a useful addition to your own boats, or those of the 'Investigator,' when searching parties may be detached from the ships in the spring, the 'Herald' will return to the Sandwich Islands, there to fill up provisions; and from thence proceed to Hongkong on her way to England, in pursuance of our orders of the 14th December last.

12. On detaching the 'Plover' to take up her winter quarters, you will direct Commander Moore to remain there until you join him, or, failing your return to him, until the end of the summer of 1853; when, but not until it is absolutely necessary for securing the 'Plover's' passage through the Aleutian Group of Islands, he is to quit Behring's Straits, and make the best of his way to Valparaiso (touching at the Sandwich Islands for refreshment), where he will receive further instructions relative to his return to England, from the Commander-in-Chief.

13. If the 'Herald' and 'Plover' should be fallen in with to the northward and eastward of Behring's Straits, or in the Polar Sea, Captain Kellett, on detaching himself from your company, should consort with the 'Plover' as far as her winter quarters, and if time and circumstances admitted of it, he should assist in securing her there.

14. In the event of your having to winter your ships on the continent or Esquimaux shores, you will probably meet with some of the wandering tribes, or with Indians. With these you will cultivate a friendly feeling, by making them presents of those articles to which they are apt to attach a value: but you will take care not to suffer yourself to be surprised by them, but use every precaution, and be constantly on your guard against any treacherous attack. You will also, by offering rewards, to be paid in such manner as you may be able to arrange, endeavour to prevail on them to carry to any of the settlements of the Hudson's Bay Company an account of your situation and proceedings, with an urgent request that it may be forwarded to England with the utmost possible despatch.

15. In whatever place you may have to establish your winter quarters, you will devote every resource in your power to the preservation of the health, the comfort, and the cheerfulness of the people committed to your care.

16. We leave it to your judgment and discretion as to the course to be pursued after passing Point Barrow, and on entering the ice; and you will be materially assisted in this respect by what you will learn from Captain Kellett, if he should be fallen in with at the Sandwich Islands, as well as from the observations of Sir E. Parry, and Captain Beechey, contained in the Memoranda of which we send you copies.

17. We have desired that you shall be furnished, not only with a copy of the Orders under which Commander Moore is now acting, but also with copies of all the Orders which from time to time have been given to Captain Kellett, as well as with those under which an attempt

was made to relieve the 'Erebus' and 'Terror' by Captain Sir James Ross, on the eastern side through Baffin's Bay. You will further be supplied with all the printed Voyages or Travels in those northern regions; and the Memoranda and Instructions drawn up by Sir John Richardson, as to the manners and habits of the Esquimaux, and the best mode of dealing with that people (a copy of which is also sent), will afford a valuable addition to the information now supplied to you.

18. We deem it right to caution you against suffering the two vessels placed under your orders to separate, except in the event of accident or unavoidable necessity; and we desire that you will keep up the most unreserved communication with the Commander of the 'Investigator,' placing in him every proper confidence, and acquainting him with the general tenour of your Orders, and with your views and intentions from time to time; so that the Service may have the full benefit of your united efforts in the prosecution of such a service; and, that in the event of any unavoidable separation, or of any accident to yourself, Commander M'Clure may have the advantage of knowing, up to the latest period, all your ideas and designs relative to the satisfactory completion of this undertaking.

19. We also recommend that as frequent an exchange may take place as conveniently may be, of the observations made in the two ships; that any information obtained by the one be as quickly as possible communicated for the advantage and guidance of the other.

20. In case of any irreparable accident happening to the 'Enterprise,' you are hereby authorized to take command of the 'Investigator,' and to make such arrangements for the officers and crews as may be most consonant to the Rules of the Service, and most conducive to the objects of the Expedition.

21. In the event of Great Britain being involved in hostilities with any foreign power during your absence, you are to abstain from the smallest act of aggression towards any vessel belonging to such nation, it being the practice of all civilized countries to consider vessels engaged in service of this kind as exempt from the rules and operations of war.

22. In carrying out the foregoing Orders, you will avail yourself of every practicable occasion of acquainting our Secretary with every step of your progress, as well as with your future intentions; and occasionally during your voyage you will throw overboard one of the tin cylinders with which you have been supplied, (headed up in any cask or

barrel that you could manufacture or spare,) containing an account of the date, position, etc. On your reaching England, you will call on every person, in both vessels, to deliver up their logs, journals, charts, and drawings, but which, they may be informed, shall be returned to them in due time.

23. With respect to your search proving fruitless, and your finally quitting the Polar Seas, as well as your securing your winter quarters towards the close of any one season, we cannot too strongly impress upon you the necessity of the utmost precaution and care being exercised in withdrawing in time, so as in no case to hazard the safety of the ships, and the lives of those entrusted to your care, by your being shut up in a position which might render a failure of provisions possible.

We feel it unnecessary to give you more detailed instructions, which might possibly embarrass you in a service of this description; and we have therefore only to repeat our perfect reliance on your judgment and resolution, both in doing all that is possible to relieve the missing ships, and in withdrawing in time, when you come to the painful conclusion that your efforts are unavailing.

24. You will bear in mind that the object of the Expedition is to obtain intelligence, and to render assistance to Sir John Franklin and his companions, and not for the purposes of geographical or scientific research; and we conclude these Orders with an earnest hope that Providence may crown your efforts with success, and that they may be the means of dispelling the gloom and uncertainty which now prevail respecting the missing Expedition.

Given under our hands this 15th day of January, 1850,

(Signed) F. T. Baring.
J. W. D. Dundas.

By Command of their Lordships,

(Signed) J. Parker.

*To* Richard Collinson, Esq., C.B.,
*Captain of Her Majesty's Ship Enterprise,*
*at Devonport.*

## No. VIII.

*Copy of Instructions addressed to Captain Sir John Franklin, K.C.H., Her Majesty's ship Erebus, dated 5th May, 1845.*

*By the Commissioners for executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.*

1. Her Majesty's Government having deemed it expedient that a further attempt should be made for the accomplishment of a North-west Passage by sea from the Atlantic to the Pacific Ocean, of which passage a small portion only remains to be completed, we have thought proper to appoint you to the command of the Expedition to be fitted out for that service, consisting of Her Majesty's ships 'Erebus' and 'Terror;' and you are hereby required and directed, so soon as the said ships shall be in all respects ready for sea, to proceed forthwith in the 'Erebus' under your command, taking with you Her Majesty's ship 'Terror,' her Captain (Crozier) having been placed by us under your orders, taking also with you the 'Barretto Junior' transport, which has been directed to be put at your disposal for the purpose of carrying out portions of your provisions, clothing, and other stores.

2. On putting to sea, you are to proceed, in the first place, by such a route as, from the wind and weather, you may deem to be the most suitable for despatch, to Davis' Strait, taking the transport with you to such a distance up that Strait as you may be able to proceed without impediment from ice, being careful not to risk that vessel by allowing her to be beset in the ice, or exposed to any violent contact with it; you will then avail yourself of the earliest opportunity of clearing the transport of the provisions and stores with which she is charged for the use of the Expedition, and you are then to send her back to England, giving to the agent or master such directions for his guidance as may appear to you most proper, and reporting by that opportunity your proceedings to our Secretary, for our information.

3. You will then proceed in the execution of your orders into Baffin's Bay, and get as soon as possible to the western side of the Strait, provided it should appear to you that the ice chiefly prevails on the eastern side, or near the middle; the object being to enter Lancaster Sound with as little delay as possible; but as no specific directions can be given, owing to the position of the ice varying from year to year, you will, of course, be guided by your own observations as to the course

most eligible to be taken, in order to ensure a speedy arrival in the Sound above mentioned.

4. As, however, we have thought fit to cause each ship to be fitted with a small steam-engine and propeller, to be used only in pushing the ships through channels between masses of ice, when the wind is adverse, or in a calm, we trust the difficulty usually found in such cases will be much obviated; but as the supply of fuel to be taken in the ships is necessarily small, you will use it only in cases of difficulty.

5. Lancaster Sound, and its continuation through Barrow's Strait, having been four times navigated without any impediment by Sir Edward Parry, and since frequently by whaling ships, will probably be found without any obstacles from ice or islands; and Sir Edward Parry having also proceeded from the latter in a straight course to Melville Island, and returned without experiencing any, or very little, difficulty, it is hoped that the remaining portion of the passage, about nine hundred miles, to Behring's Strait, may also be found equally free from obstruction; and in proceeding to the westward, therefore, you will not stop to examine any openings either to the northward or southward in that Strait, but continue to push to the westward without loss of time, in the latitude of about 74½°, till you have reached the longitude of that portion of land on which Cape Walker is situated, or about 98° west. From that point we desire that every effort be used to endeavour to penetrate to the southward and westward in a course as direct towards Behring's Strait as the position and extent of the ice, or the existence of land, at present unknown, may admit.

6. We direct you to this particular part of the Polar Sea as affording the best prospect of accomplishing the passage to the Pacific, in consequence of the unusual magnitude and apparently fixed state of the barrier of ice observed by the 'Hecla' and 'Griper,' in the year 1820, off Cape Dundas, the south-western extremity of Melville Island; and we therefore consider that loss of time would be incurred in renewing the attempt in that direction. But should your progress in the direction before ordered be arrested by ice of a permanent appearance, and that when passing the mouth of the Strait, between Devon and Cornwallis Islands, you had observed that it was open and clear of ice, we desire that you will duly consider, with reference to the time already consumed, as well as to the symptoms of a late or early close of the season, whether that channel might not offer a more practicable outlet from the Archipelago, and a more ready access to the open sea, where there would be neither islands nor banks to arrest and fix the floating

masses of ice; and if you should have advanced too far to the south-westward to render it expedient to adopt this new course before the end of the present season, and if, therefore, you should have determined to winter in that neighbourhood, it will be a matter for your mature deliberation whether in the ensuing season you would proceed by the above-mentioned Strait, or whether you would persevere to the south-westward, according to the former directions.

7. You are well aware, having yourself been one of the intelligent travellers who have traversed the American shore of the Polar Sea, that the groups of islands that stretch from that shore to the northward to a distance not yet known, do not extend to the westward further than about the 120th degree of western longitude, and that beyond this, and to Behring's Strait, no land is visible from the American shore of the Polar Sea.

8. Should you be so fortunate as to accomplish a passage through Behring's Strait, you are then to proceed to the Sandwich Islands, to refit the ships and refresh the crews; and if, during your stay at such place, a safe opportunity should occur of sending one of your officers or despatches to England by Panama, you are to avail yourself of such opportunity to forward to us as full a detail of your proceedings and discoveries as the nature of the conveyance may admit of; and in the event of no such opportunity offering during your stay at the Sandwich Islands, you are on quitting them to proceed with the two ships under your command off Panama, there to land an officer with such despatches, directing him to make the best of his way to England with them, in such a manner as our Consul at Panama shall advise, after which you are to lose no time in returning to England by way of Cape Horn.

9. If at any period of your voyage the season shall be so far advanced as to make it unsafe to navigate the ships, and the health of your crews, the state of the ships, and all concurrent circumstances should combine to induce you to form the resolution of wintering in those regions, you are to use your best endeavours to discover a sheltered and safe harbour, where the ships may be placed in security for the winter, taking such measures for the health and comfort of the people committed to your charge as the materials with which you are provided for housing in the ships may enable you to do. And if you should find it expedient to resort to this measure, and you should meet with any inhabitants, either Esquimaux or Indians, near the place where you winter, you are to endeavour by every means in your power to cultivate a

friendship with them, by making them presents of such articles as you may be supplied with, and which may be useful or agreeable to them; you will, however, take care not to suffer yourself to be surprised by them, but use every precaution, and be constantly on your guard against any hostility. You will, by offering rewards, to be paid in such manner as you may think best, prevail on them to carry to any of the settlements of the Hudson's Bay Company an account of your situation and proceedings, with an urgent request that it may be forwarded to England with the utmost possible despatch.

10. In an undertaking of this description much must be always left to the discretion of the commanding officer; and, as the objects of this Expedition have been fully explained to you, and you have already had much experience on service of this nature, we are convinced we cannot do better than leave it to your judgment, in the event of your not making a passage this season, either to winter on the coast, with the view of following up next season any hopes or expectations which your observations this year may lead you to entertain, or to return to England to report to us the result of such observations; always recollecting our anxiety for the health, comfort, and safety of yourself, your officers and men; and you will duly weigh how far the advantage of starting next season from an advanced position may be counterbalanced by what may be suffered during the winter, and by the want of such refreshment and refitting as would be afforded by your return to England.

11. We deem it right to caution you against suffering the two vessels placed under your orders to separate, except in the event of accident or unavoidable necessity; and we desire you to keep up the most unreserved communications with the commander of the 'Terror,' placing in him every proper confidence, and acquainting him with the general tenour of your orders, and with your views and intentions from time to time in the execution of them, that the Service may have the full benefit of your united efforts in the prosecution of such a service, and that, in the event of unavoidable separation, or of any accident to yourself, Captain Crozier may have the advantage of knowing, up to the latest practicable period, all your ideas and intentions relative to a satisfactory completion of this interesting undertaking.

12. We also recommend that as frequent an exchange take place as conveniently may be of the observations made in the two ships; that any scientific discovery made by the one be as quickly as possible communicated for the advantage and guidance of the other in making

their future observations, and to increase the probability of the observations of both being preserved.

13. We have caused a great variety of valuable instruments to be put on board the ships under your orders, of which you will be furnished with a list, and for the return of which you will be held responsible. Among these are instruments of the latest improvements for making a series of observations on terrestrial magnetism, which are at this time peculiarly desirable, and strongly recommended by the President and Council of the Royal Society, that the important advantage be derived from observations taken in the North Polar Sea, in co-operation with the observers who are at present carrying on a uniform system at the magnetic observatories established by England in her distant territories, and, through her influence, in other parts of the world; and the more desirable is this co-operation in the present year, when these splendid establishments, which do so much honour to the nations who have cheerfully erected them at a great expense, are to cease. The only magnetical observations that have been obtained very partially in the Arctic regions are now a quarter of a century old, and it is known that the phenomena are subject to considerable secular changes. It is also stated by Colonel Sabine that the instruments and methods of observation have been so greatly improved, that the earlier observations are not to be named in point of precision with those which would now be made; and he concludes by observing, that the passage through the Polar Sea would afford the most important service that now remains to be performed towards the completion of the magnetic survey of the globe.

14. Impressed with the importance of this subject, we have deemed it proper to request Lieutenant-Colonel Sabine to allow Commander Fitzjames to profit by his valuable instructions; and we direct you therefore to place this important branch of science under the immediate charge of Commander Fitzjames; and as several other officers have also received similar instruction at Woolwich, you will therefore cause observations to be made daily on board each of the ships whilst at sea (and when not prevented by weather and other circumstances) on the magnetic variation, dip and intensity, noting at the time the temperature of the air, and of the sea at the surface and at different depths; and you will be careful that in harbour and on other favourable occasions those observations shall be attended to, by means of which the influence of the ship's iron on the result obtained at sea may be computed and allowed for.

15. In the possible event of the ships being detained during a winter in the high latitudes, the expedition has been supplied with a portable observatory, and with instruments similar to those which are employed in the fixed magnetical and meteorological observatories instituted by Her Majesty's Government in several of the British colonies.

16. It is our desire that, in case of such detention, observations should be made with these instruments, according to the system adopted in the aforesaid observatories; and detailed directions will be supplied for this purpose, which, with the instruction received at Woolwich, will be found, as we confidently anticipate, to afford full and sufficient guidance for such observations, which will derive from their locality peculiar interest and a high theoretical value.

17. We have also directed instruments to be specially provided for observations on atmospherical refraction at very low altitudes, in case of the Expedition being detained during a winter in the high latitudes. On this subject also particular directions will be supplied, and you will add any other meteorological observations that may occur to you of general utility; you will also take occasions to try the depth of the sea and nature of the bottom, the rise, direction, and strength of the tides, and the set and velocity of currents.

18. And you are to understand that although the effecting a passage from the Atlantic to the Pacific is the main object of this expedition, yet that the ascertaining the true geographical position of the different points of land near which you may pass, so far as can be effected without detention of the ships in their progress westward, as well as such other observations as you may have opportunities of making in natural history, geography, etc., in parts of the globe either wholly unknown or little visited, must prove most valuable and interesting to the science of our country; and we therefore desire you to give your unremitting attention, and to call that of all the officers under your command, to these points, as being objects of high interest and importance.

19. For the purpose, not only of ascertaining the set of the currents in the Arctic Seas, but also of affording more frequent chances of hearing of your progress, we desire that you do frequently, after you have passed the latitude of 65° N., and once every day when you shall be in an ascertained current, throw overboard a bottle or copper cylinder closely sealed, and containing a paper stating the date and position at which it is launched; and you will give similar orders to the commander of the 'Terror,' to be executed in case of separation; and for this purpose we have caused each ship to be supplied with papers, on which is

printed, in several languages, a request that whoever may find it should take measures for transmitting it to this office.

20. You are to make use of every means in your power to collect and preserve specimens of the animal, mineral, and vegetable kingdoms, should circumstances place such within your reach without causing your detention; and of the larger animals you are to cause accurate drawings to be made, to accompany and elucidate the descriptions of them. In this, as well as in every other part of your scientific duty, we trust that you will receive material assistance from the officers under your command, several of whom are represented to us as well qualified in these respects.

21. In the event of any irreparable accident happening to either of the two ships, you are to cause the officers and crew of the disabled ship to be removed into the other, and with her singly to proceed in prosecution of the voyage, or return to England, according as circumstances shall appear to require; understanding that the officers and crews of both ships are hereby authorized and required to continue to perform the duties according to their respective ranks and stations on board either ship to which they may be so removed, in the event of an occurrence of this nature. Should, unfortunately, your own ship be the one disabled, you are in that case to take command of the 'Terror;' and in the event of any fatal accident happening to yourself, Captain Crozier is hereby authorized to take the command of the 'Erebus,' placing the officer of the Expedition who may then be next in seniority to him in command of the 'Terror.' Also in the event of your own inability, by sickness or otherwise, at any period of this service, to continue to carry these instructions into execution, you are to transfer them to the officer the next in command to you employed on the Expedition, who is hereby required to execute them in the best manner he can for the attainment of the several objects herein set forth.

22. You are, while executing the service pointed out in these instructions, to take every opportunity that may offer of acquainting our Secretary, for our information, with your progress, and on your arrival in England you are immediately to repair to this office, in order to lay before us a full account of your proceedings in the whole course of your voyage, taking care before you leave the ship to demand from the officers, petty officers, and all other persons on board, the logs and journals they may have kept, together with any drawings or charts they may have made, which are all to be sealed up, and you will issue similar directions to Captain Crozier and his officers. The said logs,

journals, or other documents to be thereafter disposed of as we may think proper to determine.

23. In the event of England becoming involved in hostilities with any other power during your absence, you are nevertheless clearly to understand that you are not on any account to commit any hostile act whatsoever, the Expedition under your orders being only intended for the purpose of discovery and science, and it being the practice of all civilized nations to consider vessels so employed as excluded from the operations of war; and, confiding in this feeling, we should trust that you would receive every assistance from the ships or subjects of any foreign power which you may fall in with; but special application to that effect has been made to the respective governments.

Given under our hands this 5th day of May, 1845,

(Signed) HADDINGTON,
G. COCKBURN,
W. H. GAGE.

*To* SIR JOHN FRANKLIN, K.C.H.,
*Captain of Her Majesty's Ship Erebus,*
*at Woolwich.*

By Command of their Lordships,

(Signed) W. A. B. HAMILTON.

## B.

*General Report on the Provisions, Preserved Meats, Comforts, Clothing, etc., constituting the Sea Stock of H.M.S. Assistance, for Arctic Service, upon her departure from England on the 21st April, 1852; with remarks as to their quality and fitness or otherwise for such service, etc.*

| Species. | Of the Sea Stock. Quantity. | By whom supplied. | Remarks. |
|---|---|---|---|
| Biscuit . . | lbs. 35,509 | Deptford Victualling Establishment | Good: as all biscuit made in the Government Yards is, and I am not aware of any peculiarity in that supplied to this Expedition. The cases, as far as we could preserve them from injury, were of great value, keeping the bread dry and preventing increase of weight and moisture, by which it became manifestly less palatable. The fifty-six-pound cases answered well; but the wood was inconvenient. *Vide* special letter on bread. |
| Flour . . . | lbs. 78,000 | . . . . | Good: but not sufficiently good to make good bread. The reason I must leave to the cooks and bakers: our private store of flour, probably at some cost, was better. |
| Concentrated Rum | gals. 2,276⅝ | . . . . | Very good. |
| Wines . . | gals. 216 | . . . . | Good: were selected without regard to slight increase of price, as they were intended for the sick and those who disliked rum. |
| Brandy . . | gals. 110 | . . . . | Good, very good, extra quality. |
| Corned Beef . | lbs. 37,808 | . . . . | Very good: but as my wishes on this matter had to give way to certain pressure from without, *vide* special letter. |
| Corned Pork | lbs. 9,370 | . . . . | That corned in the usual manner *very* salt, owing to the want of fatty mixture in the animal, and no fat introduced into the casks to remedy this deficiency. |

| Species. | Of the Sea Stock. Quantity. | By whom supplied. | Remarks. |
|---|---|---|---|
| Bacon . . (Two sides together stowed in malt bran and wrapped in canvas.) | lbs. 23,588 | . . . . | Good: but not a favourite, nor of first quality. The fat of this bacon, cured for *weight* and predominating, was not *transparent* when *boiled*. |
| Boiled Bacon (Stowed in tin cases from 50 to 58 lbs. each, filled in between with fat.) | lbs. 8,019 | . . . . | Good: but too great a proportion of fat to the lean. Better than the preceding. |
| Suet . . . | lbs. 2,106 | . . . . | Good. |
| Currants . . | lbs. 1,000 | . . . . | Good; very good. |
| Split Peas . | bush. 120 | . . . . | Very good: and *very important* that they should be the *newest* that can be procured. |
| Oatmeal . . | gals. 40 | . . . . | No complaint. |
| Sugar . . . | lbs. 20,750 | . . . . | Not so good as I could have wished: great sediment and very clayey; grain very small. |
| Chocolate . | lbs. 6,272 | . . . . | Good. |
| Ditto, paste . | lbs. 550 | Moore and Buckley | Excellent: and very important to the travelling parties. |
| Ditto, sweet . | lbs. 150 | Fortnum and Mason | Excellent: converted into a superior article to former by addition of Moore's milk. |
| Essence of Coffee | half-pints 50 | Fortnum and Mason | Very good: and frequently given to exhausted parties of men who had fallen in, instead of rum. |
| Tea . . . | lbs. 1,550 | Specially purchased for Expedition | Very superior. |
| Vinegar . . | gals. 120 | . . . . | Good. |
| Tobacco . . | lbs. 4,964 | . . . . | Good. |
| Soap . . . | lbs. 5,000 | . . . . | Customary quality supplied to Her Majesty's ship. |
| Lemon Juice | lbs. 6,108 | . . . . | Good: but owing to the bottles frequently breaking with the slightest injury, much lost. |
| Cranberries . | lbs. 3,520 | . . . . | Very good and very beneficial. |
| Normandy Pippins | lbs. 1,100 | . . . . | Very good: The apples preferred, but not sufficiently acid. They should be peculiarly so, and immersed in *syrup* or treacle for this service. |
| Dates . . . | lbs. 200 | . . . . | Very good: |
| Dried Apples | lbs. 1,144 | . . . . | Very good: |
| Dried Cabbage | lbs. 1,139 | . . . . | Excellent: very much esteemed, and when mixed with pickles much relished with pork. |

| Species. | Of the Sea Stock. Quantity. | By whom supplied. | Remarks. |
|---|---|---|---|
| Dried Carrots | lbs. 1,106 | . . . . . | The carrots require too much attention, and therefore not fit for sea service as rations. |
| Dried Potatoes | lbs. 6,885 | . . . . . | The dried potatoes excellent: may be easily used as salad or in imitation of cucumber. The seamen did not take to them, because they require more time and attention than Edwards's potato. |
| Milk solidified | lbs. 490 | Fadeuille and Company | Very good, particularly for invalids; requires to be kept in air-tight vessels, and the directions implicitly obeyed, or its quality very much impaired. |
| Milk, Moore's | hf.-pints 600 | Moore and Buckley | Very good, and convenient for immediate use. The cold caused it to deposit large crystals of sugar, and the deposit in tea after this was very much increased. |
| Pickles— | | | |
| Mixed . . | lbs. 1,599 | . . . . . | There can be no mistake about pickles,—cannot be *bad*, but all of best quality. |
| Cabbage . | lbs. 1,593 | . . . . . | |
| Onions . . | lbs. 1,600½ | . . . . . | |
| Walnuts . | lbs. 1,594 | . . . . . | |
| Potatoes, Edwards's | lbs. 7,224 | Edwards and Company | Very good and convenient for immediate use, probably better for general service than the dried, but for the table the purity of the appearance of the dried and the variety of its uses render it necessary as a luxury. |
| Preserved Meats | lbs. 20,668 | . . . . . | All the preserved meats and soups supplied to this Expedition are of the best quality—Hogarth's superior—but it cannot be doubted that *for this service* they are very much overcooked. |
| Preserved Soups | lbs. 6,898 | . . . . . | |
| Preserved Vegetables | lbs. 12,881 | . . . . . | |
| Portable Soups (glaze soups) | lbs. 1,629 | Fortnum and Mason | The portable soups very valuable, particularly when substituting game for the rations. |
| Rice . . . | lbs. 1,120 | . . . . . | Good. |
| Maccaroni . | lbs. 1,125 | . . . . . | Very good: has been substituted for pounded biscuit in pemmican, and considered of great importance: they have neglected Edwards's potato for it. |

| Species. | Of the Sea Stock. Quantity. | By whom supplied. | Remarks. |
|---|---|---|---|
| Dried Cod . | lbs. 448 | . . . . | Fish not admired: but the Finnon haddock *very good*—used more by officers. |
| Finnon Haddock | lbs. 552 | Hogarth | |
| Pemmican . | lbs. 4,989½ | . . . . | Very good for the purpose supplied: that in which currants and herbs mixed much preferred. Some could hardly be induced to eat it; even went without! |
| Essence of Malt | lbs. 2,400 | . . . . | Invaluable. |
| Ditto Hops . | lbs. 84 | . . . . | |
| Ditto Spruce | lbs. 8 | . . . . | Not tried. |
| Treacle . . | lbs. 731 | . . . . | Good. |
| Seed: Mustard and Cress | lbs. 40 | . . . . | Good, and satisfactorily produced. |
| Onion Powder | lbs. 617½ | Fortnum and Mason | Excellent: but the men, if left to themselves, use more at a time than proper. It incommodes the traveller. |
| Curry Powder | lbs. 20 | Fortnum and Mason | Good: supply too small for use generally. |
| Ditto Paste . | lbs. 16 | Captain White | Very good. |
| Baking Powder | lbs. 200 | | Of very great importance, and particularly to weak stomachs; but better flour required for this service. |
| Salt . . . | lbs. 294 | . . . . | Good. |
| Pepper, Black (whole) | lbs. 240 | Fortnum and Mason | Good. |
| Ditto Cayenne | lbs. 20 | Fortnum and Mason | Very important to travelling parties. Men who refused pemmican, induced by this and onion powder to take it. |
| Chillies, dried | lbs. 10 | Fortnum and Mason | Much relished at the travelling luncheon (mixed with mustard prepared beforehand). |
| Dried Yeast . | lbs. 39 | Fortnum and Mason | Very good. |
| Mustard, Durham | lbs. 880 | Fortnum and Mason | Very good, but yet not sufficiently strong,—*darker* was *selected.* |
| Burton Ale . | gals. 540 | Messrs. Allsopp | By experiments made at a temperature of 42° on deck, it was found to stand + 12° before affording any symptom of congelation. *Very good* and *very important;* its loss will be felt next spring. |
| Paint— | | | |
| Vermilion . | lbs. 2 | . . . . | Not used. |
| Black . . | lbs. 2 | . . . . | |
| Yellow . . | lbs. 2 | . . . . | |

| Species. | Of the Sea Stock. Quantity. | | By whom supplied. | Remarks. |
|---|---|---|---|---|
| Looking-glasses | No. | 12 | . . . . | Very inferior and too easily broken; the best articles should be left with natives, to prove our superiority in manufactures. This remark applies throughout, and I had good reason to know in the Pacific that we could obtain anything for English goods, when they instantly refused any offer of our Transatlantic brethren. |
| Snuff . . . | lbs. | 10 | | |
| Knives— | | | | |
| Clasp . . | No. | 19 | | |
| Butchers' . | No. | 67 | | |
| Long-bladed | No. | 28 | | |
| Needles . . | No. | 860 | | |
| Scissors' . . | No. | 25 | | |
| Thimbles . . | No. | 58 | | |
| Beads . . . | lbs. | 4 | | |
| Hand-saws . | No. | 15 | | |
| Files . . . | No. | 21 | . . . . | Very indifferent. |
| Helves for Axes | No. | 10 | | |
| Carpenters' Axes | No. | 20 | | |
| Meerschaum Pipes | No. | 91 | . . . . | Very good: but the clay were preferred. Have no opinion of my own to offer. |
| Fishermen's Boots | prs. | 294 | . . . . | Require improvement: they are of very inferior *workmanship*, and will not bear *ripping open*, which should be done, as with preserved meat tins, *promiscuously*. |
| Flannel, of colours | yds. | 270 | | |
| Blue Crape . | yds. | 186 | . . . . | Answers well, and good in quality. |
| Southwesters | No. | 91 | | |
| Grey Guernsey Frocks | No. | 273 | . . . . | Good. |
| Shawls . . | No. | 91 | . . . . | Very much superior to the comforters. |
| Seal-skin Caps | No. | 91 | . . . . | Not as good as expected: skins badly cured. |
| Ditto, Mits . | prs. | 91 | . . . . | Same. |
| Welsh Wigs . | No. | 273 | . . . . | Good. |
| Spare Soles of Boots | prs. | 150 | . . . . | Very much in demand for making the spring travelling boot; also for the repairs of fishermen's boots. |
| Waterproof Composition for Boots | lbs. | 51 | . . . . | Succeeded perfectly. |

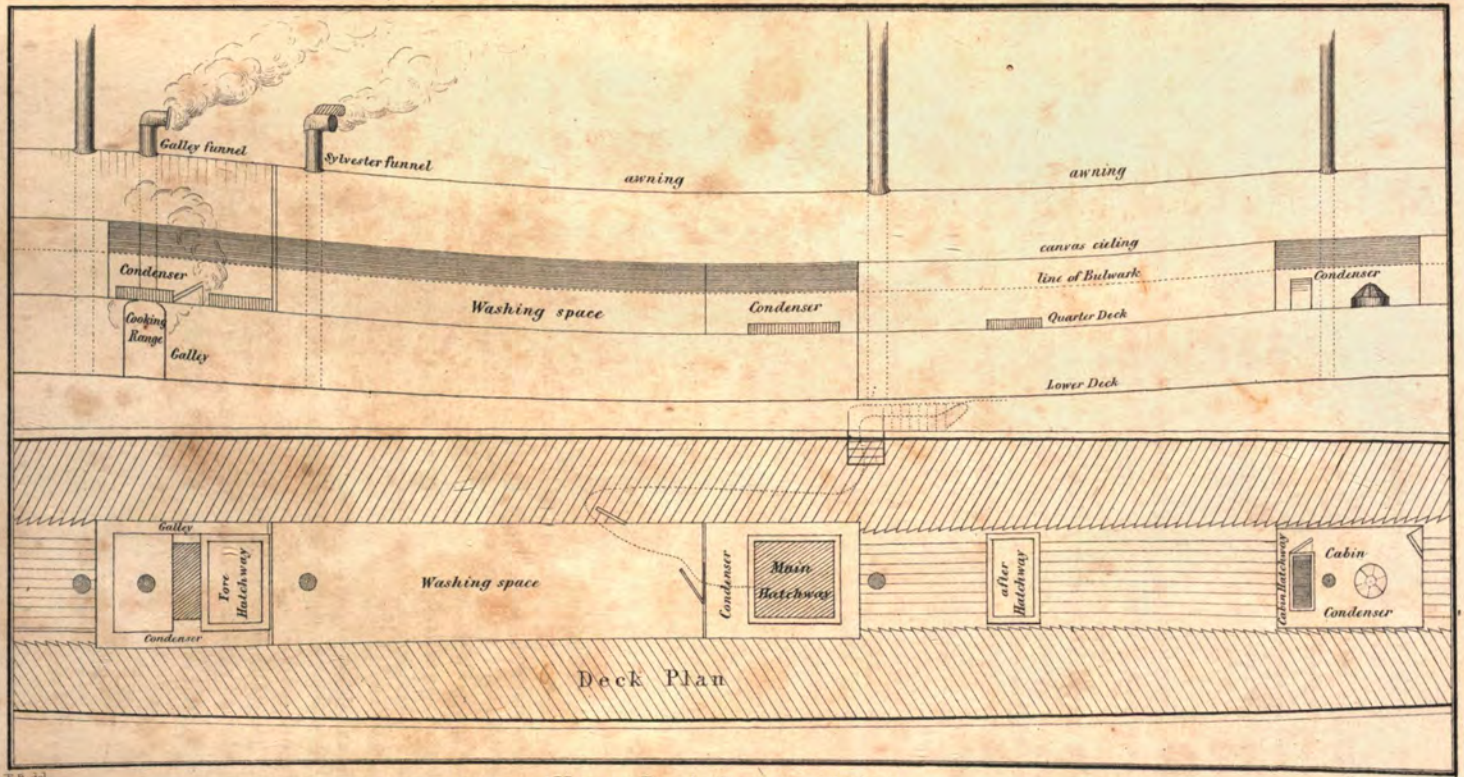
| Species. | Of the Sea Stock. Quantity. | By whom supplied. | Remarks. |
|---|---|---|---|
| Blue box-cloth Jackets | No. 181 | . . . . | Material good: but very few found to fit: workmanship not so good. |
| Ditto, Trousers | prs. 181 | . . . . | It would be preferable, both for officers and men, to allow a certain sum to be paid by the Paymaster, on the production of the suits fitting each person. |
| Felt Blankets | No. 101 | . . . . | Not sufficiently close: were not according to *original tender*. |
| Buffalo Robes | No. 27 | . . . . | The same: too small, and their loss much felt by the ships. |
| Deer-skin Mits | prs. 91 | . . . . | Not so good as sample. |
| Woollen Mits | prs. 745 | . . . . | Good: but of various qualities. |
| Carpet Boots | prs. 256 | . . . . | The same objection applies to them as to fishermen's boots—not well made. |
| Boot Hose, with leather feet | prs. 273 | . . . . | Very good: but all of one size; generally too large. |
| Boot Hose, plain | prs. 464 | . . . . | Good: but did not stand much wear or chafe. |
| Seal-skin Jackets | No. 91 | . . . . | Not approved; skins not well dressed, heavy, tore easily and stunk intolerably. |
| Ditto Trousers | prs. 91 | . . . . | Same: moose skin far preferable. |
| Chamois leather Mocassins | prs. 400 | . . . . | Very variable, not put together in pairs, and got up without regard to workmanship. |
| Esquimaux Boots | prs. 62 | . . . . | Disapproved: rotted, and thrown away travelling. |
| Blue Cloth, No. 2 | yds. 217 | . . . . | Not admired: too open. Fine No. 1 would have been taken up readily. |
| Duck . . . | yds. 1480 | . . . . | Do.: customary. |
| Flannel . . | yds. 1035 | . . . . | Do. do. |
| Blue knitted Jackets | No. 50 | . . . . | Do. |
| White wove Jackets | No. 250 | . . . . | Do. |
| Worsted Stockings | prs. 1200 | . . . . | Not fit for this service: dear for the quality: shrink terribly. |
| Worsted Mits | prs. 500 | . . . . | Good. |
| Worsted Caps | No. 100 | . . . . | Good. |
| Blue Serge . | yds. 960 | . . . . | Good. |
| Blankets . . | No. 112 | . . . . | Better quality required for this climate: last time Hudson's Bay provided, and one issued gratis to each man. |
| Shirts . . . | No. 350 | | Customary. |

| Species. | Of the Sea Stock. Quantity. | By whom supplied. | Remarks. |
|---|---|---|---|
| Black Silk Handkerchiefs | No. 200 | . . . . | Not much demand. |
| Strong Shoes | prs. 100 | . . . . | Do. |
| FlushingJackets | No. 25 | . . . . | Do. |
| Flushing . . | yds. 120 | . . . . | Do. |
| Marks of distinction— | | | |
| First Class . | No. 6 | . . . . | Do. |
| Second Class | No. 4 | . . . . | Do. |
| Half-boots . | prs. 125 | | |
| Spare Soles . | prs. 100 | . . . . | Large supply required, and of same quality as the gratuitous. |
| Beds . . . | No. 69 | | |

## C.

### *Winter Fittings.*

In the construction of the winter housing hitherto practised in Arctic vessels, it has been considered necessary to cover the main hatchway completely, caulking it down and filling the space between the under and upper sides of the hatchway (a depth of two feet) with packed oakum. Three hatchways are left open,—one forward for the crew; one abaft the mainmast for the officers; and the last, before the mizen mast, for the captain; all these are fitted with close hoods lined with felt, and adapted with upper and lower doors,—the intention being that one should close before the other is opened; but it is evident that where the wills and purposes of more than one individual are concerned that no such intention could be carried out. The result inevitably is, that in two of these approaches to the lower deck a continuous stream of cold air, of the temperature on deck (or that of the external air), is constantly rushing down and meeting the warmer air below, condensing it instantly into a dense white vapour, or it becomes absorbed by the ice ever coating the spaces between the beams. This vapour would instantly be converted into ice, if the upper heated current of breath did not prevent it. The result is, that the beams become charged with large drops of water, which fall to the deck, and by all these combined effects maintain an unhealthy wet and vapour bath.




Upper Deck fittings 1853-4.

F.B. del.
Vincent Brooks Imp.

Condensers of all kinds have been tried, but merely to increase the evil by admitting more cold air.

I instantly comprehended this nuisance in 1852, and I would then have remedied it, but the force of public opinion, for public peace, must not be contravened. If I failed then, most decidedly I should have been victimized. I deemed it wiser, first, to let them decide (without theorizing on what might have happened) on the reality resulting from unscientific arrangements, carefully watching every evil process, and registering my vow to remove it next season. My measures were thus prepared before the autumn of 1853, but the materials were too scant for the thorough completion of my scheme, which was based on the following objects to be attained.

First, the tilt-awning, *old and inefficient*, might be compared to a threadbare tent which had seen a summer's rain,—it would keep out snow, but not wind; I therefore determined to ceil overhead, at seven feet above deck, by a complete layer of boats, spars, and the heavy sails; these rested on the skid beams; the space above this, to the pitch of the awning, was seven feet; lighter canvas was also nailed on the under side of the skid beams; the sides being also doubly screened, by spare sails, formed inner walls three feet within the outer curtain. So far the deck was better protected, and every aperture for air closed.

I now constructed a cabin on deck, occupying the entire space between the fore and main masts; this was subdivided into three compartments.

First, the galley and steam-escape condenser; air-tight, excepting the door for snow and the vertical escape of vapour by a small hatch.

Second, the after compartment, including the main hatchway and a space of seven feet before it, as a kind of landing-place. This had a door with weight and pulley.

Third, the middle space, devoted to washing purposes, was entered by a door having weight and pulley on the starboard side, but so far forward as not to permit any cold air from the outer entrance reaching it.

The main hatchway was *open*, and the *only general* thoroughfare. The fore hatchway was closed, and the galley facings removed, so as to allow the radiation free play aft and on each side.

The Observatory, a complete house,* was erected over my cabin, including the companion hatchway and skylight, and extending two feet abaft it. The skylight was filled in with the travelling furs and sawdust, so that the circular aperture, five inches in diameter, could be opened at pleasure for ventilation. Latterly, the officers' companion

* Marked Cabin Condensor in Plate XIX.

was well covered with canvas, and formed another condenser. Two illuminators were taken out abreast the foremast, one on each side, and casks inverted, with a pad of oakum, to prevent the access of air. Under these fittings we derived deck condensers to the amount of 4200 cubic feet. But to prevent the ingress of cold air from without, the porch was constructed by an aperture sufficient for one man, and guarded by falling vertical screens. The first landing outside was on the deck level, where the accommodation ladder led aft to the floe; there a door with weight and pulley kept all secure; this passage, therefore, was rectangular, and could not *lead in* any cold air, as it would escape under the lower ladder, which was above the level of the upper side of the door.* The difference resulting was very decided: comfort and dryness prevailed between decks, and the quarter-deck enjoyed generally a *still air* with a temperature twenty degrees higher. The Plate annexed will, I trust, sufficiently explain these fittings.

The framework might very easily be fitted before leaving England, and the short planks be stowed away *on deck* until required. Even when *complete* the entire area exposed above the gunwhale of the 'Assistance' was only thirty-nine yards, about equivalent to three feet off the foot of the mainsail. When secured for winter, the tilt-housing would be seven feet above this, fore and aft.

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## D.

### *Weight and Analysis of Cubes of Salt Water or Floe Ice.*

The cubes were taken by accurate gauges from large masses of ice, lifted from the floe during the period at which it became permanently solid for the season. They were taken from the upper, centre, and inferior portions, so as to afford distinct evidence as to their power of retaining water and of the amount due to evaporation after exposure.

As the results of Table I. (p. 295) afford materials for the purposes of any one inclined to investigate, I shall offer no observation at present, but for the use of the general reader they have been reduced to the value of a cubic inch; and, although they were kept within our housing, on a shelf on deck, it will be apparent, so far as they could be minutely weighed, they appeared to gain and lose without satisfactory reason.

Water from the same ice has been analysed by Dr. Thompson, M.D., which is also given in the Tables following.

* *Vide* dotted line Plate XIX.

*Analyses of Salt Water or Floe Ice, by Dr. R. D. Thompson, of St. Thomas's Hospital.*

1.—*Analysis of the Arctic Floe in* 1000 *grains of Water.*

| | No. 1. | No. 3. | No. 4. | No. 6. |
|---|---|---|---|---|
| Specific gravity . . . . | 1004 | 1006 | 1007 | 1007 |
| Sesquioxide of Iron and Phosphate . . . . . | ·010 | ·050 | ·010 | ·008 |
| Insoluble Lime . . . . | Trace | ·009 | ·032 | ·025 |
| Soluble Lime . . . . . | ·078 | ·142 | ·113 | ·103 |
| Insoluble Magnesia . . . | ·024 | ·041 | ·043 | ·052 |
| Soluble Magnesia . . . . | ·124 | ·363 | ·471 | ·360 |
| Sodium . . . . . | 1·739 | 1·933 | 2·708 | 2·286 |
| Potassium . . . . . | ·594 | ·096 | ·128 | ·096 |
| Chlorine . . . . . | 2·723 | 3·476 | 4·424 | 3·950 |
| Sulphuric Acid . . . . | ·372 | ·472 | ·575 | ·497 |
| Carbonic Acid . . . . . | ·052 | ·128 | ·140 | ·154 |

From Northumberland Sound, N. lat. 76° 52′, W. long. 97°.
No. 1. October 24, 1852. From the under six inches of the floe.
No. 3. October 24, 1852. From the upper six inches of the floe.
Nos. 4 and 6. October 24, 1852.

2.—*Composition of Floe Water, calculated from the preceding Table, in grains per* 1000 *grains of Water.*

| | No. 1. | No. 3. | No. 4. | No. 6. |
|---|---|---|---|---|
| Sesquioxide of Iron and Phosphate . . . . . | ·010 | ·050 | ·010 | ·008 |
| Carbonate of Lime . . . | Trace | ·016 | ·058 | ·046 |
| Sulphate of Lime . . . . | ·189 | ·344 | ·274 | ·250 |
| Carbonate of Magnesia . . | ·050 | ·110 | ·090 | ·110 |
| Chloride of Magnesium . . | ·289 | ·859 | 1·122 | ·855 |
| Sulphate of Potash . . . | ·133 | ·220 | ·284 | ·220 |
| Sulphate of Soda . . . . | ·355 | ·300 | ·504 | ·442 |
| Chloride of Sodium . . . | 4·132 | 4·668 | 6·129 | 5·454 |
| Total residue . . . . | 5·158 | 6·567 | 8·471 | 7·385 |
| Residue by evaporation . | 5·400 | 6·600 | 8·340 | 7·280 |

The water of the ice is obviously derived from land sources, but the amount of common salt present among the saline ingredients shows that, in addition to the natural salts which all water which has been in contact with the land contains, some sea salts are intermixed.

3.—*Analysis of Arctic Sea Water.*

| | No. 2. | No. 7. |
|---|---|---|
| Specific gravity . . . . . | 1026 | 1027 |
| Sesquioxide of Iron and Phosphate . | ·010 | ·022 |
| Insoluble Lime . . . . . | ·027 | ·091 |
| Soluble Lime . . . . . | 1·260 | ·474 |
| Insoluble Magnesia . . . . . | ·110 | ·081 |
| Soluble Magnesia . . . . . | ·571 | ·491 |
| Sodium . . . . . | 10·853 | |
| Potassium . . . . . | ·384 | ·432 |
| Chlorine . . . . . | 17·950 | 17·585 |
| Sulphuric Acid . . . . . | 1·986 | 2·040 |
| Carbonic Acid . . . . . | ·284 | ·260 |

The numbers are from the tickets pasted on the bottles.
No. 2. Four feet below ice (with alkaline reaction).
No. 7. Ten fathoms, spring tide (with alkaline reaction).

4.—*Composition of Arctic Sea Water, calculated from the preceding Table.*

| | No. 2. | No. 7. |
|---|---|---|
| Sesquioxide of Iron and Phosphate . | ·010 | ·022 |
| Carbonate of Lime . . . . . | ·048 | ·091 |
| Sulphate of Lime . . . . . | 2·711 | 1·149 |
| Chloride of Calcium . . . . . | ·283 | |
| Carbonate of Magnesia . . . . . | ·232 | ·171 |
| Sulphate of Magnesia . . . . . | ... | 1·380 |
| Chloride of Magnesium<br>Bromide of Magnesium . . . . . | 1·353 | ·097 |
| Sulphate of Potash . . . . . | ·854 | ·965 |
| Chloride of Sodium . . . . . | 27·621 | 28·916 |
| | 33·112 | 32·791 |

These waters are characterized by the presence of a larger quantity of Carbonates of Lime and Magnesia, particularly of the latter, than is usual in sea-water; no doubt due to the proximity of rocks containing these earths. The waters possessed a strongly alkaline reaction, derived from the influence of these earths in their soluble condition.

No. 1. *Record of Experiments made on board H.M.S. 'Assistance,' during the Winter 1852–3, to ascertain the Amount of Evaporation from Cubes of Salt-Water.*

| Date of commencing Experiments. | Description and Measurement of Ice tried. | Weight of Ice on commencing Experiments. | Weights of Ice after Exposure for | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 day. Oct. 27. | 2 days. Oct. 28. | 3 days. Oct. 29. | 4 days. Oct. 30. | 5 days. Oct. 31. | 6 days. Nov. 1. | 20 days. Nov. 15. |
| 1852. | | lbs. oz. | lbs. oz. | lbs. oz. | lbs. oz. | lbs. oz. | lbs. or. | lbs. oz. | lbs. oz. |
| Oct. 26 | 1 cubic foot, under surface* | 50 0 | 49 12½ | 49 12 | 49 10 | 49 8 | 49 8 | 49 6 | 49 6 |
| Oct. 26 | 1 cubic foot, upper surface† | 50 0 | 49 12½ | 49 12 | 49 10 | 49 5 | 49 4 | 49 4 | 49 4 |
| Nov. 27 | 1 cubic foot, under surface, much honeycombed‡ . | 53 10 | These two cubes were injured by a fall before they were weighed again. | | | | | | |
| Nov. 27 | 1 cubic foot, upper surface | 51 2 | | | | | | | |

| Date of commencing Experiments. | Description and Measurement of Ice tried. | Weight of Ice on commencing Experiments. | Weights of Ice after Exposure for | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 35 days. Jan. 1. | | 41 days. Jan. 7. | | 7 days. Jan. 7. | 25 days. Jan. 25. | 37 days. Apr. 4. |
| | | | lbs. oz. | | lbs. oz. | | lbs. oz. | lbs. oz. | lbs. oz. |
| Nov. 27 | 6-inch cube, under surface | 8 2 | ... | ... | 7 3 | | | | |
| Nov. 27 | 6-inch cube, centre ice . . | 8 0 | ... | ... | 7 5½ | | | | |
| Nov. 27 | 6-inch cube, upper surface | 8 0 | ... | ... | 7 13 | | | | |
| Nov. 27 | 4-inch cube, under surface | 2 4 | ... | ... | 2 2 | 2 3½ | | | |
| Nov. 27 | 4-inch cube, centre ice . . | 2 6½ | ... | ... | 2 2 | 2 6½ | | | |
| Nov. 27 | 4-inch cube, upper surface | 2 8 | ... | ... | 2 2½ | 2 7½ | | | |
| 1853. | | | | | | | | | |
| Jan. 1 | 1 cubic foot, under surface§ | 51 1 | ... | ... | ... | ... | 50 0 | 51 0 | |
| Jan. 1 | 1 cubic foot, centre ice . . | 52 1 | ... | ... | ... | ... | 51 6 | 52 6 | |
| Jan. 1 | 1 cubic foot, upper surface | 51 8 | ... | ... | ... | ... | 50 0½ | 50 7 | |
| Jan. 1 | 6-inch cube, under surface | 7 3 | ... | ... | ... | ... | 7 4 | 7 2½ | |
| Jan. 1 | 6-inch cube, centre ice . . | 7 5½ | ... | ... | ... | ... | 7 5 | 7 4½ | |
| Jan. 1 | 6-inch cube, upper surface | 7 13 | ... | ... | ... | ... | 7 11½ | 7 13 | |
| Jan. 1 | 4-inch cube, under surface | 2 3½ | ... | ... | ... | ... | 2 2 | 2 2½ | |
| Jan. 1 | 4-inch cube, centre ice . . | 2 6 | ... | ... | ... | ... | 2 2 | 2 2½ | |
| Jan. 1 | 4-inch cube, upper surface | 2 7½ | ... | ... | ... | ... | 2 3 | 2 2¾ | |
| Jan. 1 | 3-inch cube, under surface | 1 0 | ... | ... | ... | ... | 1 0 | 1 0 | |
| Jan. 1 | 3-inch cube, centre ice . . | 0 15½ | ... | ... | ... | ... | 0 15½ | 0 15 | |
| Jan. 1 | 3-inch cube, upper surface | 0 13½ | ... | ... | ... | ... | 0 13½ | 0 14½ | |
| Jan. 1 | 2-inch cube, under surface | 0 4½ | ... | ... | ... | ... | 0 4 | 0 4½ | |
| Jan. 1 | 2-inch cube, centre ice . . | 0 4½ | ... | ... | ... | ... | 0 4½ | 0 4½ | |
| Jan. 1 | 2-inch cube, upper surface | 0 4½ | ... | ... | ... | ... | 0 4½ | 0 4½ | |
| Jan. 1 | 1 inch wide, 1 inch broad, and six inches long . . | 0 4 | ... | ... | ... | ... | 0 4 | 0 3¾ | |
| 1854. | | | | | | | | | |
| Feb. 26 | 1 cubic foot, under surface | 54 10 | ... | ... | ... | ... | ... | ... | 54 7 |
| Feb. 26 | 1 cubic foot, centre ice . . | 55 12 | ... | ... | ... | ... | ... | ... | 56 4 |
| Feb. 26 | 1 cubic foot, upper surface | 53 14 | ... | ... | ... | ... | ... | ... | 54 2 |
| Feb. 26 | 6-inch cube, under surface | 6 13 | ... | ... | ... | ... | ... | ... | 7 0 |
| Feb. 26 | 6-inch cube, centre ice . . | 7 6½ | ... | ... | ... | ... | ... | ... | 7 9¾ |
| Feb. 26 | 6-inch cube, upper surface | 6 11 | ... | ... | ... | ... | ... | ... | 6 13½ |
| Feb. 26 | 4-inch cube, under surface | 2 2 | ... | ... | ... | ... | ... | ... | 2 1½ |
| Feb. 26 | 4-inch cube, centre ice . . | 2 4 | ... | ... | ... | ... | ... | ... | 2 4½ |
| Feb. 26 | 4-inch cube, upper surface | 2 2 | ... | ... | ... | ... | ... | ... | 2 2¾ |
| Feb. 26 | 3-inch cube, under surface | 0 15½ | ... | ... | ... | ... | ... | ... | 0 14¾ |
| Feb. 26 | 3-inch cube, centre ice . . | 1 0 | ... | ... | ... | ... | ... | ... | 1 1½ |
| Feb. 26 | 3-inch cube, upper surface | 0 15 | ... | ... | ... | ... | ... | ... | 1 0¼ |
| Feb. 26 | 2-inch cube, under surface | 0 5 | ... | ... | ... | ... | ... | ... | 0 5¼ |
| Feb. 26 | 2-inch cube, centre ice . . | 0 5 | ... | ... | ... | ... | ... | ... | 0 4½ |
| Feb. 26 | 2-inch cube, upper surface | 0 4¾ | ... | ... | ... | ... | ... | ... | 0 5 |
| Feb. 26 | 1 inch wide, 1 inch broad, and six inches long . . | 0 3½ | ... | ... | ... | ... | ... | ... | 0 3¾ |

* Thickness of Ice (new floe) deprived of snow 17 inches.

† Thickness of Ice (new floe) deprived of snow 17 inches.

‡ Thickness of Ice (new floe) deprived of snow 26 inches.

§ Thickness of Ice (new floe) deprived of snow 42 inches.

No. 2. *Results of the preceding Experiments, reduced to values on one cubic inch.*

| Date. | Size of Cube. | These columns represent days exposed, weight of cube in ounces, and 1 cubic ounce. | | | | | | | | | | | | | | Average Temperatures. | Thickness of new Floe. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oz. | 1 cub. in. | 1 day. | 1 cub. in. | 7 days. | 1 cub. in. | 20 days. | 1 cub. in. | 25 days. | 1 cub. in. | 35 days. | 1 cub. in. | 37 days. | 1 cub. in. | | |
| 1852. | Inches. | Oz. | | Oz. | | | | Oz. | | Oz. | | Oz. | | Oz. | | | Inches. |
| Oct. 26 | 12 l. | 800·00 | ·4626 | 897·5 | ·4607 | ... | ... | 790·0 | ·4571 | ... | ... | ... | ... | ... | ... | −10·82 | 17 |
| ,, | 12 u. | 800·00 | ·4626 | 897·5 | ·4607 | ... | ... | 788·0 | ·4560 | | | | | | | | |
| Nov. 27 | 6 l. | 130·00 | ·6019 | ... | ... | ... | ... | ... | ... | ... | ... | 115·0 | ·5324 | ... | ... | −32·31 | 26 |
| ,, | 6 c. | 128·00 | ·5926 | ... | ... | ... | ... | ... | ... | ... | ... | 117·5 | ·5448 | | | | |
| ,, | 6 u. | 128·00 | ·5926 | ... | ... | ... | ... | ... | ... | ... | ... | 125·0 | ·5787 | | | | |
| ,, | 4 l. | 86·00 | ·5625 | ... | ... | ... | ... | ... | ... | ... | ... | 34·0 | ·5312 | | | | |
| ,, | 4 c. | 85·50 | ·6016 | ... | ... | ... | ... | ... | ... | ... | ... | 34·0 | ·5312 | | | | |
| 1853. | 4 u. | 40·00 | ·6250 | ... | ... | ... | ... | ... | ... | ... | ... | 34·5 | ·5391 | | | | |
| Jan. 1 | 12 l. | 817·00 | ·4728 | ... | ... | 800·0 | ·4626 | ... | ... | 816·00 | ·4722 | ... | ... | ... | ... | ... | 42 |
| ,, | 12 c. | 833·00 | ·4821 | ... | ... | 822·0 | ·4758 | ... | ... | 838·00 | ·4850 | | | | | | |
| ,, | 12 u. | 824·00 | ·4767 | ... | ... | 804·5 | ·4656 | ... | ... | 807·00 | ·4670 | | | | | | |
| ,, | 6 l. | 115·00 | ·5312 | ... | ... | 114·5 | ·5301 | ... | ... | 114·50 | ·5301 | | | | | | |
| ,, | 6 c. | 117·50 | ·5440 | ... | ... | 117·0 | ·5417 | ... | ... | 116·50 | ·5393 | | | | | | |
| ,, | 6 u. | 125·00 | ·5787 | ... | ... | 123·5 | ·5717 | ... | ... | 125·00 | ·5787 | | | | | | |
| ,, | 4 l. | 35·50 | ·5547 | ... | ... | 39·0 | ·5312 | ... | ... | 34·25 | ·5351 | | | | | | |
| ,, | 4 c. | 38·00 | ·5938 | ... | ... | 34·0 | ·5312 | ... | ... | 34·50 | ·5390 | | | | | | |
| ,, | 4 u. | 39·50 | ·6172 | ... | ... | 35·0 | ·5468 | ... | ... | 3·75 | ·5430 | | | | | | |
| ,, | 3 l. | 16·00 | ·5926 | ... | ... | 16·0 | ·5926 | ... | ... | 16·00 | ·5926 | | | | | | |
| ,, | 3 c. | 15·25 | ·5648 | ... | ... | 15·5 | ·5741 | ... | ... | 15·00 | ·5556 | | | | | | |
| ,, | 3 u. | 13·50 | ·5000 | ... | ... | 13·5 | ·5070 | ... | ... | 14·50 | ·5371 | | | | | | |
| ,, | 2 l. | 4·25 | ·5500 | ... | ... | 4·5 | ·5625 | ... | ... | 4·25 | ·5500 | | | | | | |
| ,, | 2 c. | 4·50 | ·5625 | ... | ... | 4·5 | ·5625 | ... | ... | 4·50 | ·5625 | | | | | Mean for | |
| ,, | 2 u. | 4·50 | ·5625 | ... | ... | 4·5 | ·5625 | ... | ... | 4·50 | ·5625 | | | | | Jan. . −40·37 | |
| Feb. 26 | 12 l. | 874·00 | ·5058 | ... | ... | 8·0 | ... | ... | ... | ... | ... | ... | ... | 871·00 | ·5044 | Feb. . −32·19 | 62, cut near fire-hole. |
| ,, | 12 c. | 892·00 | ·5162 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 900·00 | ·5208 | March −17·75 | |
| ,, | 12 u. | 862·00 | ·4988 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 866·00 | ·5012 | | |
| ,, | 6 l. | 109·00 | ·5046 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 112·00 | ·5185 | Mean −24·96 | |
| ,, | 6 c. | 118·50 | ·5474 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 121·75 | ·5473 | | |
| ,, | 6 u. | 107·00 | ·4953 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 109·25 | ·5046 | | |
| ,, | 4 l. | 34·00 | ·5313 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 33·25 | ·5196 | | |
| ,, | 4 c. | 36·00 | ·5625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 36·50 | ·5703 | | |
| ,, | 4 u. | 34·00 | ·5313 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 34·75 | ·5430 | | |
| ,, | 3 l. | 15·25 | ·5649 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 14·75 | ·5463 | | |
| ,, | 3 c. | 16·00 | ·5926 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 17·50 | ·6481 | | |
| ,, | 3 u. | 15·00 | ·5556 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 16·25 | ·6019 | | |
| ,, | 2 l. | 5·00 | ·6250 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5·75 | ·7187 | | |
| ,, | 2 c. | 5·00 | ·6250 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 4·50 | ·5625 | | |
| ,, | 2 u. | 4·00 | ·5937 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5·00 | ·6250 | | |

No. 3. *Tabular view of Upper, Centre, and Lower surfaces of the Floe.*

| Date. | Size of Cube. | Lower surface of Ice. | | | | | | | | Middle. | | | | | | | | Upper surface. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Fresh. | 1 day. | 7 d. | 20 d. | 25 d. | 35 d. | 37 d. | 41 d. | Fresh. | 1 d. | 7 d. | 20 d. | 25 d. | 35 d. | 37 d. | 41 d. | Fresh. | 1 d. | 7 d. | 20 d. | 25 d. | 35 d. | 37 d. | 41 d. |
| 1852. | In. | | | | | | | | | | | | | | | | | | | | | | | | |
| Oct. 26 | 12 | ·4626 | ·4607 | ... | ·4571 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·4626 | ·4607 | ... | ·4560 | | | | |
| Nov. 27 | 12 | ·4965 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·4733 | | | | | | | |
| ,, | 6 | ·6019 | ... | ... | ... | ... | ·5324 | ... | ... | ·5926 | ... | ... | ... | ... | ·5448 | ... | ... | ·5926 | ... | ... | ... | ... | ·5727 | | |
| ,, | 4 | ·5625 | ... | ... | ... | ... | ·5772 | ... | ·5547 | ·6016 | ... | ... | ... | ... | ·5312 | ... | ·6016 | ·6250 | ... | ... | ... | ... | ·5391 | ... | ·6172 |
| 1853. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Jan. 1 | 12 | ·4728 | ... | ·4626 | ... | ·4722 | ... | ... | ... | ·4820 | ... | ·4758 | ... | ·4850 | ... | ... | ... | ·4767 | ... | ·4656 | ... | ·4670 | | | |
| ,, | 6 | ·5312 | ... | ·5301 | ... | ·5301 | ... | ... | ... | ·5440 | ... | ·5417 | ... | ·5393 | ... | ... | ... | ·5787 | ... | ·5717 | ... | ·5787 | | | |
| ,, | 4 | ·5547 | ... | ·5312 | ... | ·5351 | ... | ... | ... | ·5938 | ... | ·5312 | ... | ·5390 | ... | ... | ... | ·6172 | ... | ·5468 | ... | ·5430 | | | |
| ,, | 3 | ·5926 | ... | ·5926 | ... | ·5926 | ... | ... | ... | ·5468 | ... | ·5741 | ... | ·5556 | ... | ... | ... | ·5000 | ... | ·5000 | ... | ·5371 | | | |
| ,, | 2 | ·5500 | ... | ·5625 | ... | ·5500 | ... | ... | ... | ·5625 | ... | ·5625 | ... | ·5625 | ... | ... | ... | ·5625 | ... | ·5625 | ... | ·5625 | | | |
| Feb. 26 | 12 | ·5058 | ... | ... | ... | ... | ... | ·5044 | ... | ·5162 | ... | ... | ... | ... | ... | ·5208 | ... | ·4988 | ... | ... | ... | ... | ... | ·5012 | |
| ,, | 6 | ·5046 | ... | ... | ... | ... | ... | ·5185 | ... | ·5474 | ... | ... | ... | ... | ... | ·5473 | ... | ·4950 | ... | ... | ... | ... | ... | ·5046 | |
| ,, | 4 | ·5313 | ... | ... | ... | ... | ... | ·5196 | ... | ·5625 | ... | ... | ... | ... | ... | ·5703 | ... | ·5313 | ... | ... | ... | ... | ... | ·5430 | |
| ,, | 3 | ·5469 | ... | ... | ... | ... | ... | ·5463 | ... | ·5926 | ... | ... | ... | ... | ... | ·6081 | ... | ·5556 | ... | ... | ... | ... | ... | ·6019 | |
| ,, | 2 | ·6250 | ... | ... | ... | ... | ... | ·7187? | ... | ·6250 | ... | ... | ... | ... | ... | ·5625 | ... | ·5937 | ... | ... | ... | ... | ... | ·6250 | |
| ,, | 1 | ·5416 | ... | ... | ... | ... | ... | ... | ... | ·5416 | | | | | | | | | | | | | | | |
| | | ·5387 | ·4607 | ·5358 | ·4571 | ·5360 | ·5324 | ·5222 | ·5547 | ·5689 | ... | ·5370 | ... | ·5363 | ·5380 | ·5618 | ·6016 | ·5402 | ·4607 | ·5293 | ·4560 | ·5376 | ·5559 | ·5551 | ·6172 |

The result affords us the following values:—

| | | |
|---|---|---|
| Weight within 4 hours | ·54927 | |
| After 7 days' exposure | ·53417 | Mean dry, ·54023. |
| ,, 25 days' exposure | ·53663 | |
| ,, 35 days' exposure | ·53843 | |
| ,, 37 days' exposure | ·54637 | This is clearly a heavier Ice late in the season. |

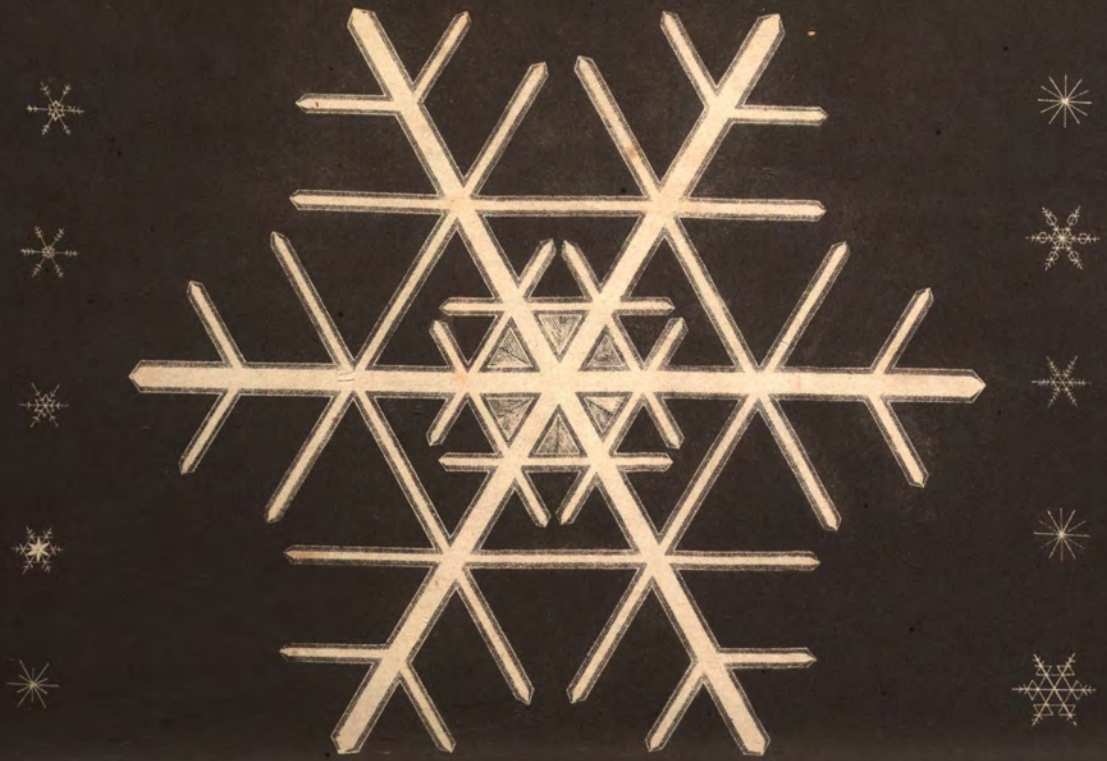
## E.

### *Observations on Ice Crystals.*

In several places in my narrative it may be noticed that I have exhibited a peculiar interest in the varied forms of snow crystals; possibly, to the minds of some, unable to appreciate the study of nature, deemed extravagant. Until that be proven I am content to abide all the infliction which such pointless weapons can inflict. My intercourse with the world convinces me that no energy of character can be expected where no steady intelligent pursuit of some department of science is not followed with confidence as well as enthusiasm. It has not unfrequently happened that a vigorous zeal, or an incomprehensible excitement, on apparently wild schemes, has impelled individuals forward, some to easy fame, others to difficulty and unmerited obscurity. Such, to my own knowledge, was the fate of the early supporters of coal-gas, that then dreaded element of illumination, but now, after forty-five years' struggle, safely handled by the most timid as well as ignorant.

These remarks result from certain observations made by unthinking persons,—certainly not admirers, nor lights of science, if they even comprehend its outlines,—tending to sneer at or undervalue the labours of Scoresby, Glaisher, and others, for frittering away their time in the pursuit of the objects under consideration. Let such foes to science read and comprehend the researches on crystallization and cleavage, and they may then comprehend how much the gem-cutter or the worker on the granite masses composing our proudest edifices owes to such investigations.

Before leaving England I had not communicated, directly or indirectly, with any individual upon the matter of snow crystals; but for more than forty years I have been deeply interested in the study of crystals chemically, as well as in a mineralogical point of view.



F. B. del.

Vincent Brooks Lith.

During my journeys over the ice in spring and autumn, when a restless mind naturally sought for some object to fill up the gap, I first became simply interested in watching the beautiful forms which fell on my rough jacket and remained suspended in the nap; or frequently, when engaged anxiously watching the passing clouds to obtain a glimpse of the sun, a single well-defined crystal has fallen on the cold arc of my sextant, and, aided by the attached microscope, I have profited by the opportunity to effect a perfect examination.

The pilot, by long practice and the use of his reasoning faculties, even of very ordinary calibre, is enabled to read the heavens, the clouds, tides, winds, and other phenomena with almost unerring precision. My course of life surely entitles me to such a habit. But whether granted or not, I did so far transgress as to class the forms which fell under my notice, after nearly two years' meditation, into decidedly meteorological characters, denoting, to my mind at least, the state of the atmosphere.

But a few years since the study of the law of storms excited but little attention; many inquired if I believed in them; but who is rash enough at the present day to doubt their truth? Science is making rapid strides, and what is occurring at the antipodes is, by a document now before me, really becoming matter of discussion on the other side of the Atlantic!

"Of what use is science?" escaped the lips of two persons high in office. With what result, consult the undying address of the President of the British Association at the meeting held at Birmingham.

Wonderful to the uneducated appear the advances made of late years in navigation; sensible people cease to withhold credit to those engaged in its amelioration; and our own Government, in conjunction with that of the United States, has now instituted, by the advice of competent "lights of science" or "master-minds," a distinct Meteorological Department, in order to collect data and construct charts adapted for the whole world, which will enable the skilful mariner to sail over certain curves which offer him the avoidance of calm

or hurricane, and the advantage of prevailing winds to shorten his voyage, decrease his danger, and save that most valuable of all commodities—Time.

Such matters in Arctic navigation, or in snow travel, are to be calculated, or anticipated, with equal precision, by the study of the forms of snow crystals, which, to the observant mind, are merely varieties of rain,—the result of causes in action, and from which fine or bad weather may naturally be prognosticated.

Three classes were made by me, and termed :—

1. Stars and garters—from their resemblance to the order of knighthood and perfection of crystal, or such as might result from temporary currents of electricity suddenly forming and condensing vapour, as compared to fine, light, passing showers between bright gleams of sun. It will of course be understood that such light rain, which in other climes would not obscure the sun, would in the state of snow be more opaque.

2. Rain—heavy flocculent snow, cohering, and into which the travellers and sledge sank deeply, warning the intelligent officer that he had better pitch his tent, and reserve the strength of his crew for a period when *search* would be *rational.*

3. Bad-omened—fine, spicular snow, the result of No. 1 broken by the wind into fine particles: this induced us to expect the sharp rain attended by wind of other climates, but did not hinder travel,—it was not so opaque as to impede vision.

These remarks apply simply to the question of *utility* in such pursuits; and, as regards the terms selected by me, were adapted to the minds of those by whom I was surrounded, and who fully understood, in their own way, the full intent of the freemasonry which most leaders maintain with their followers.

Frequent study induced me to figure what appeared to me to be the primitive form of the perfect crystal, and to reject the more complicate, but yet most beautiful, as interminable additions to the primitive, conformable to the law of congealed

J. Glaisher del.

Vincent Brooks Lith.

water. In my examinations I detected the perfect hexagonal prismatic formation of every ray, and that the additional rays disposed themselves invariably at angles of 60° and 120° to the primitive six-rayed crystal, followed in succession by others parallel to the main ray, this alternate succession producing eventually the most complicate and beautiful star.

One peculiarity prevailed, which I am glad to notice verified by some of those lately exhibited by Mr. Glaisher; this is, the prolongation of the arms crossing the primary crystal—longest on the exterior or lesser angle and shorter within, as may be noticed on the larger crystals of Plate XX. In Plate XIX. it will be seen that my drawing would agree nearly with the small crystal in the corner, and that the prolongation of the secondary additions to Plate XX. on the left would fall nearly into that drawn by me on the spot.

The means of careful examination of a single radial arm of one inch and a half in length was furnished by bushels of such fragments occurring in the snow furrows. These were noticed during my spring travel of 1853, and it is curious that not more than two were found by me connected. They completely represented the fern-like form noticed by Mr. Glaisher. During winter, the beams and illuminators of my store-rooms abaft my cabin became incrusted with the condensed vapours in still more perfect aggregations; and in May, 1854, I had a final opportunity by daylight, under a temperature of −5°, of deliberately investigating similar masses of such forms—beds, as it were, of crystalline ferns—taken from the rafters of our Crystal Palace.

In the crystal which I have endeavoured to exhibit in its simplest change from the primitive, I have adopted merely the initial or secondary spurs. If the observer will add in succession, at similar angles to the primary and secondary, other spurs, in accordance with an outward centrifugal, or explosive, inclination, omitting the inner short arms, he will then be able to form some idea of the most highly finished of Nature's immediate achievements. But these I find do not occur among those noticed in England. Such were my

own observations, to which I am happy to add the following, kindly furnished by Mr. Glaisher.

"In regard to the subject of snow crystals, the severe period at the commencement of this year threw much additional light, and satisfactorily established that, with the exception of diminished size, the snow crystals of our latitudes are as complex as those of colder regions, to which formerly they were supposed to be confined, and in consequence were designated Polar snow by ancient writers, of whom Aristotle and Descartes were among the first. This supposition, independently of the evidence furnished by the correspondence of my own drawings and those of Dr. Scoresby and Sir Edward Belcher, seems to be pretty nearly disproved by the prevalence of one common character existing in all that I have noticed during the last two winters, when they have constituted no unimportant part of my meteorological investigations.

"The base of each figure that I examined was either a star of six radii or a plane hexagon, the accessions to the original figure being composed of spiculæ, prisms, rhomboids, or hexagons, aggregated around the principal radii at an angle of 60°, in strict accordance with the law applying to the crystallization of water. The size of these beautiful formations might be considered to vary from an almost infinitesimal speck to 0·5 inch in diameter, 0·1 and 0·2 being the most prevalent sizes that I observed.

"To the naked eye their general effect differed considerably, in some instances being perfectly arborescent and fern-like in character, in others as produced by the interlacing of spiculæ or prisms; these last might be considered to belong rather to the lower temperatures than the former, which had somewhat an affinity to the beautiful incrustations that we witness on glass during frosty weather. Of the greater number that I observed the radii were of even length, and the incrustations on them similar; but some I recorded of which three long alternated with three short radii, the former richly laden with secondary and tertiary formations, the latter slender and but slightly laden. Such figures were more frequently

Glaisher del.

Vincent Brooks Lith.

to be met with at the commencement of the frost, and very seldom perfect, being fractured in their descent. Towards the conclusion of the frost, and when the severity of the weather had been long continued, the prevailing character of these bodies might be said to change: they were less often to be seen in the intermediate stages of crystallization, and were of more solid structure and richly incrusted than those of any other period, and presented on investigation combinations of solid figures cut into facets, which glistened with crystalline transparency, according to the inflections of the light upon their surfaces.

"The observation of these bodies may not improbably assist in the solution of higher problems; at present we are greatly in doubt respecting their origin, and I regret that I have been able to throw so little light on this part of the subject, although I had frequent facilities of observing the method of their change from one figure to another, which was accomplished with inconceivable rapidity and kaleidoscope movement very beautiful to witness.

"My method of observing these bodies was to receive them upon a piece of plate-glass, either plain or coloured, which had been previously exposed, and thus cooled down to several degrees below the temperature of the air. I was by this means able to examine them in their progress towards dissolution with much minuteness, and it was interesting to observe the groups of prisms nearest the apex dissolve, in so doing thickening and elongating the spiculæ which had served as axes to the prisms. Beyond recording the forms of these bodies, I have been able to determine very little that is satisfactory concerning them. I came however to infer that the greater the cold the greater their departure from the figure of the simple star, and the further removed they were in their component parts from any similitude to the common icicle or to the incrustations on the surface of water at its first congelation.

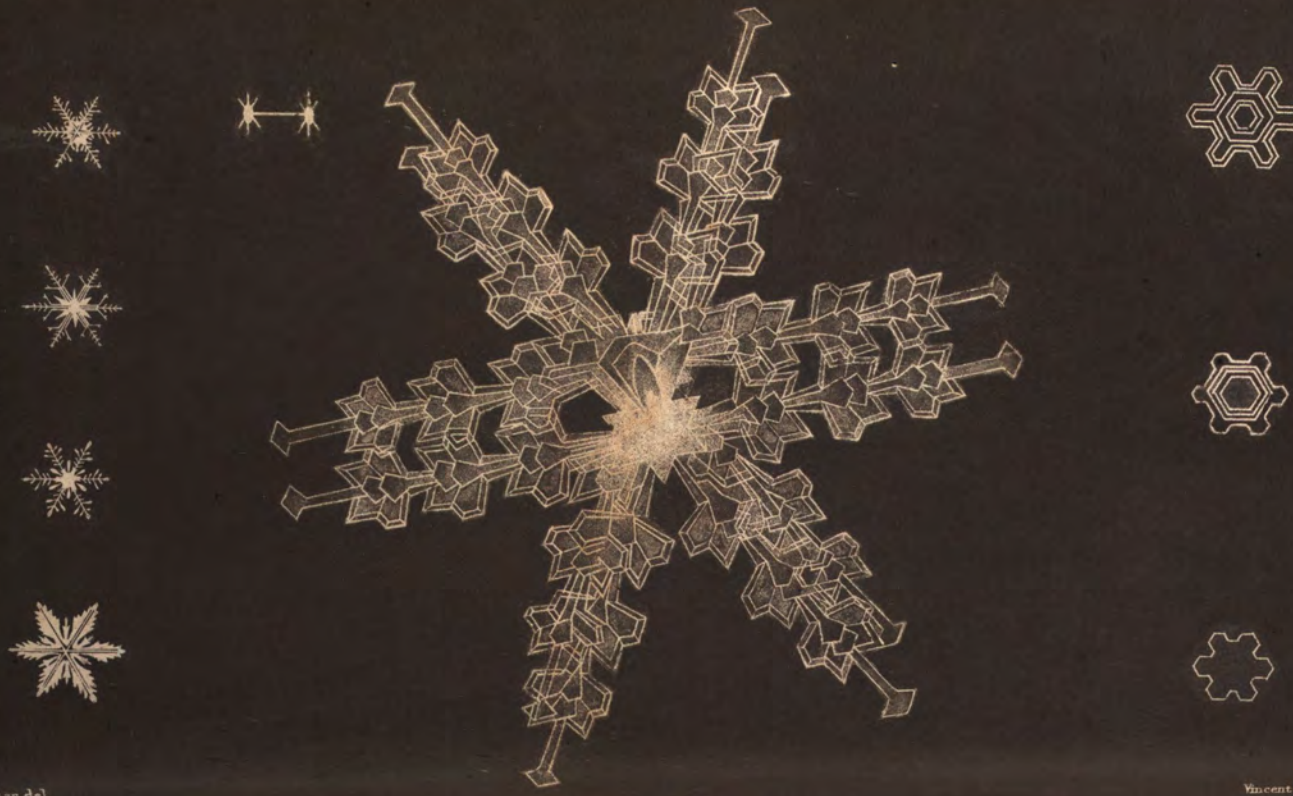
"In the early period of the frost I traced much analogy between these figures and such incrustations, with the great exception, that the latter never assumed the stellar form, but

were to be met with in groups of single primal, for the most part irregularly distributed and in the richest profusion; this order of figures included larger crystals than those of high crystalline formation, which were frequently 0·05 inch and even less in diameter, and were intensely glistening, and independently of the various planes composing them, were marked with inner parallel tracings, such as I have alone seen recorded by Dr. Scoresby.

"The great tendency of these bodies, so far as I could observe, was to simplify themselves from the moment of their descent,—whether from the difference of temperature, or from an alteration in the chemical constituents of the atmosphere near the surface of the ground, I am as yet ignorant. That they go through various changes in their descent is undoubted, judging from various appearances, which to me were perfectly anomalous, until towards the close of the cold weather I was able to ascertain the method of their final dissolution, immediately preceding which every line became (if I may so say) relaxed and every angle blunted. This in part explained the seeming anomaly presented by several of intermediate formations, which towards the apex of their radii were crowned with to all appearance tufts of jagged and serrated leaves, quite unlike the geometric precision of these figures and their avoidance of curved lines generally.

"This I subsequently, and with reason, attributed to the partial thawing of the crystal in some of the regions of the atmosphere through which it had passed in falling, in some one of which it had become thawed and again frozen, the frosted appearance being due to small granulated particles, which had subsequently accumulated upon these portions whilst in a transition state.

"I observed during this period a great variety of double crystals, the greater number falling on the last morning of the continued frost; they were about 0·2 inch in diameter, and united by a slender and almost imperceptible axis at right angles to the plane of each; the rays were either identical in position, or intermediate, in either case exhibiting great complexity



laisher del.

Vincent Brooks Lith.

of effect. All that I observed double might be classed among the higher order of crystals, and I do not recollect an instance of a double crystal being closely allied to the primitive stellar figure.

"It is remarkable that on the morning of the thaw the crystals were those originally of a high order, but attenuated and reduced to the faintest possible semblance of, I have no doubt, their original very complex structure; and this is more than a vague inference, as they continued to collapse and simplify themselves without ceasing until the moment of their disappearance, and which evidently was a continuation of the operations which had been constantly in action during their descent. The temperature at which I observed them was some degrees above freezing, and the thermometer had only the same morning turned to rise above the low temperatures which had for so many weeks prevailed. The air was at this time genial and mild, more so than might have been expected from the reading of the thermometer. After a week's intermission the frost set in again, but with less rigour, and snow crystals were abundant; but their entire character was changed, and, with a temperature many degrees below that of the morning of the thaw, there fell, unaccompanied by snow, a large number of primitive stellar crystals, as different in character to those before alluded to, as it is well possible to imagine, for the probable reason that on the morning of the thaw the upper regions of the air were intensely cold, a supposition borne out by the recurrence of the frost after a short interval; whilst on the mornings when the last-mentioned stellar crystals made their appearance, it is reasonable to suppose that the intense cold above had mitigated; a conjecture borne out by the decreasing severity of the weather, which, though for many successive weeks considerably below the average for the season, yet soon attained too high a temperature for the continuance of these investigations. The great difference of character between the crystals of the last day of the frost and its recommencement, a week later, is very significant of an entire change of atmospheric conditions. The study of these

bodies, and the changes they undergo whilst under our observation, and which may be considered a reversal of the laws by which they were originally formed, is an investigation full of interest in itself, and will probably give collateral aid to other and higher branches of meteorological inquiry."

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## F.

*General Tables of Meteorology.*

In the compilation of the following Tables I have selected only from the records the noon, midnight, and mean readings of the Barometer, the maxima, minima, and mean of Thermometers, and similar data on all other points.

From the autumn of 1852 to the summer of 1853 the records used are those of the Observatory on shore, and comprise *hourly observations*, when magnetic disturbances did not call for them more frequently.

The matters registered on shore coincided so nearly with those made by the best instruments on board, read two-hourly, that I had no misgivings as to the perfection of the observations, and consequently of the attention of those entrusted with their record.

This was the more material in the second season; and having a perfect value resulting from a proof of fifteen standard thermometers, mercurial from $-40°$ upwards, and spirit from $-63{\cdot}5°$ upwards, the best, or that representing the mean of all, was adopted as the standard; the others (reduced to thirteen) were also registered, as before, in order to correct any irregularities, under an inverted boat suspended at the Driver boom-end.

The whole of these thermometers, furnished partly from Greenwich by Mr. Glaisher, and partly from the Kew Observatory, have been safely returned to this country, and are now valuable standards of comparison for very low temperatures.

# METEOROLOGICAL TABLES.

## MAY, 1852.

*Passage from Stromness to Greenland.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | Lower Deck. | | | Spirit Room. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| May 1 | 30·090 | 29·950 | 30·538 | 54·0 | 48·0 | 50·333 | 49·833 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W to SW, calm | 0 to 4 | bc. ocm. cqd. |
| 2 | 29·990 | 30·000 | 29·937 | 55·0 | 49·0 | 50·44 | 49·55 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W to SW | 3 to 6 | ocqm. odcq. bc. |
| 3 | 30·200 | 30·150 | 30·130 | 49·0 | 47·0 | 48·25 | 48·33 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, SW, W by N | 3 to 5 | odcq. bc. |
| 4 | 29·510 | 29·900 | 29·830 | 50·0 | 48·0 | 48·83 | 48·66 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W to SW by S | 4 to 9 | bc. cm. ocq. |
| 5 | 29·180 | 29·480 | 29·435 | 49·0 | 42·0 | 44·916 | 46·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, WSW, SW by S | 3 to 9 | ocqd. bcq. oc. |
| 6 | 29·550 | 29·450 | 29·414 | 45·0 | 42·0 | 42·416 | 46·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | WSW, NW, W, SW by W | 2 to 6 | ocd. cq. bcq. |
| 7 | 29·300 | 29·450 | 29·435 | 48·0 | 44·0 | 45·33 | 47·00 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW by W, S by W, SSW | 3 to 4 | bcq. bc. bcp. |
| 8 | 29·020 | 29·020 | 29·220 | 49·0 | 47·0 | 47·50 | 47·83 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SSW, S, W | 1 to 4 | bc. cpq. obc. or. |
| 9 | 29·320 | 29·100 | 29·182 | 48·0 | 42·0 | 43·75 | 47·083 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, WSW, S | 4 to 9 | bcp. cqr. cqo. bc. |
| 10 | 29·600 | 29·400 | 29·440 | 47·0 | 40·0 | 44·83 | 47·16 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, SE, E, ENE | 2 to 5 | bcq. cqm. op. cd. |
| 11 | 29·650 | 29·620 | 29·607 | 49·0 | 45·0 | 46·83 | 47·090 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, N, NE | 1 to 3 | bc. |
| 12 | 29·850 | 29·780 | 29·776 | 48·0 | 44·0 | 46·66 | 47·00 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, SE by E, WNW | 1 to 2 | bc. |
| 13 | 29·340 | 29·550 | 29·546 | 50·0 | 40·0 | 43·83 | 46·458 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, W, SW, S, W | 1 to 4 | bc. oc. or. |
| 14 | 29·900 | 29·550 | 29·562 | 50·0 | 40·0 | 44·916 | 43·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, NE by N | 3 to 7 | bc. cd. ocqr. boq. |
| 15 | 29·900 | 29·920 | 29·930 | 42·0 | 36·0 | 38·583 | 40·25 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE by N, N, SW | 1 to 4 | bc. oc. bc. |
| 16 | 29·800 | 29·850 | 29·840 | 43·0 | 39·0 | 41·416 | 41·50 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, WSW, W | 1 to 2 | bc. o. co. |
| 17 | 29·790 | 29·700 | 29·725 | 43·0 | 39·0 | 39·50 | 40·16 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, WNW, N | 1 to 4 | o. bc. |
| 18 | 29·700 | 29·800 | 29·805 | 44·0 | 38·0 | 41·66 | 39·583 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N, NNW, SW | 1 to 5 | bc. c. od. oc. |
| 19 | 30·180 | 30·000 | 29·992 | 44·0 | 37·0 | 39·66 | 39·75 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, W, NW, WNW, WSW | 3 to 6 | bc. oc. bc. |
| 20 | 29·720 | 30·050 | 29·997 | 41·0 | 33·0 | 37·375 | 36·75 | ... | ... | ... | ... | ... | ... | ... | ... | ... | WSW, SW, S | 3 to 5 | bc. c. ocd. |
| 21 | 29·640 | 29·580 | 29·592 | 35·0 | 32·0 | 33·409 | 34·227 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S by W, SE, E by S, E by N | 3 to 5 | cod. oms. cos. cd. |
| 22 | 29·640 | 29·620 | 29·560 | 34·5 | 30·5 | 32·33 | 33·50 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNE, calm, ESE | 0 to 3 | oc. bc. cms. |
| 23 | 29·620 | 29·700 | 29·743 | 34·5 | 30·0 | 31·541 | 32·625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SE, ESE, SSE, E | 2 to 4 | os. bc. |
| 24 | 29·380 | 29·420 | 29·361 | 39·5 | 34·5 | 36·375 | 34·625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, W, ENE, calm | 0 to 4 | bc. bcm. |
| 25 | 29·640 | 29·520 | 29·537 | 38·0 | 33·5 | 36·166 | 34·875 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, SW, S, N | 0 to 5 | cm. cqms. cqd. |
| 26 | 29·920 | 29·900 | 29·872 | 35·0 | 28·0 | 30·583 | 32·00 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N, ENE, E | 1 to 3 | oms. oc. |
| 27 | 29·820 | 29·720 | 29·730 | 32·5 | 29·0 | 31·166 | 31·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, ENE, SSE, S by E | 3 to 5 | com. bc. o. |
| 28 | 30·020 | 29·950 | 29·920 | 35·0 | 30·5 | 32·66 | 32·166 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, SW, calm | 4 to 0 | oc. oms. |
| 29 | 30·100 | 30·120 | 30·064 | 36·0 | 32·5 | 34·50 | 32·708 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, S | 0 to 4 | oms. bc. oms. |
| 30 | 29·780 | 29·850 | 29·858 | 40·0 | 32·5 | 37·416 | 34·33 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, NE, calm | 0 to 1 | oms. bc. |
| 31 | 29·860 | 29·960 | 29·882 | 43·0 | 36·0 | 38·833 | 35·833 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, SE by E | 0 to 1 | bc. bcm. c. |

# JUNE, 1852.

*In Baffin's Bay, working through the Ice on the Eastern Side; Melville Bay, etc.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | Lower Deck. | | | Spirit Room. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| June 1 | 29·920 | 29·800 | 29·899 | 48·0 | 41·0 | 45·750 | 37·166 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNE, NE, calm | 0 to 3 | bc. |
| 2 | ·950 | 30·050 | ·988 | 48·0 | 42·0 | 45·250 | 36·333 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNE, calm, ENE | 0 to 1 | bc. |
| 3 | ·850 | 29·900 | ·850 | 48·0 | 40·0 | 45·750 | 35·666 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ENE, calm | 0 to 2 | bc. |
| 4 | ·850 | ·940 | ·915 | 47·0 | 40·0 | 43·833 | 35·958 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, NE, NNW | 0 to 2 | bc. |
| 5 | ·850 | ·850 | ·845 | 50·0 | 42·0 | 47·916 | 37·291 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNW, SE, NW | 1 to 5 | bc.bcq. |
| 6 | 30·030 | ·890 | ·941 | 39·0 | 32·5 | 35·625 | 36·750 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, calm, SE | 0 to 5 | bc.os. |
| 7 | 29·620 | ·910 | ·863 | 49·0 | 41·0 | 43·833 | 38·208 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm | 0 | bc. |
| 8 | ·680 | ·500 | ·541 | 58·0 | 48·5 | 51·583 | 40·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, SE, NNW, NW | 2 to 5 | bc.bcq.oc. |
| 9 | 30·080 | 30·050 | 30·010 | 42·0 | 35·0 | 37·416 | 37·833 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, SE, SE by S | 2 to 4 | oc.oms. |
| 10 | 29·600 | 29·800 | 29·798 | 45·0 | 39·0 | 41·125 | 38·416 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SE, E by N, ENE, SE | 1 to 4 | bc.oms.c. |
| 11 | 29·550 | ·550 | ·565 | 45·0 | 32·5 | 38·458 | 36·041 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, calm, NNE | 0 to 5 | bc.bcq. |
| 12 | ·780 | ·650 | ·660 | 39·5 | 37·0 | 37·875 | 36·625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, SE, W, NW | 0 to 2 | bc.c. |
| 13 | ·740 | ·780 | ·759 | 41·0 | 34·0 | 38·166 | 38·333 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, E, SE, W by N, WNW | 0 to 2 | c.oom. |
| 14 | ·550 | ·750 | ·694 | 38·0 | 33·0 | 35·166 | 37·583 | ... | ... | ... | ... | ... | ... | ... | ... | ... | WNW, calm, S | 0 to 2 | c.oc.bc.oom.ocs. |
| 15 | ·440 | ·460 | ·453 | 36·0 | 33·5 | 34·583 | 33·458 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, SSE | 2 to 4 | oes.omd.bc. |
| 16 | ·560 | ·480 | ·485 | 36·5 | 33·5 | 34·666 | 33·125 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, S, SSW | 2 to 3 | bc.oms.cos. |
| 17 | ·550 | ·600 | ·580 | 39·0 | 34·5 | 35·875 | 34·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | WSW, W, calm, E by S | 0 to 3 | oms.com. |
| 18 | ·560 | ·450 | ·464 | 36·0 | 34·0 | 34·958 | 32·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N by E, E, calm, W | 0 to 6 | bc.ocq. |
| 19 | ·800 | ·840 | ·775 | 39·0 | 34·0 | 35·458 | 33·083 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, E | 6 to 2 | oeqs.bc. |
| 20 | 30·100 | ·940 | ·960 | 38·0 | 31·0 | 33·625 | 32·666 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, NE, NW, W | 2 to 4 | com.ocqs. |
| 21 | ·120 | 30·120 | 30·114 | 34·5 | 31·5 | 32·458 | 31·125 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, calm, NW, NNW | 0 to 3 | cos.bc.c. |
| 22 | ·160 | ·180 | ·160 | 35·0 | 29·5 | 31·875 | 31·166 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNW, calm, NE by N | 0 to 3 | c.bc.m. |
| 23 | ·160 | ·120 | ·134 | 33·0 | 30·0 | 31·541 | 31·041 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, SSW, S | 1 to 6 | b.f.oom.s. |
| 24 | ·110 | ·180 | ·120 | 34·0 | 27·5 | 31·250 | 31·166 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SSW, NE | 1 to 2 | bc.bom.bf. |
| 25 | ·070 | ·090 | ·087 | 36·0 | 32·0 | 34·166 | 33·291 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, S, calm, W, SW | 0 to 2 | bf.bc.orm. |
| 26 | ·070 | ·070 | ·077 | 36·0 | 35·0 | 35·583 | 33·666 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, S. W, NW | 1 to 2 | oer.c.bc. |
| 27 | 29·900 | ·000 | ·007 | 35·5 | 31·5 | 33·209 | 32·666 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, N, NE, E | 1 to 2 | bom.oom. |
| 28 | ·850 | 29·890 | ·872 | 33·0 | 29·0 | 31·833 | 31·583 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, NE | 0 to 2 | ocd.oom.bom. |
| 29 | ·700 | ·800 | ·780 | 38·0 | 32·5 | 33·541 | 32·083 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, NW, SW | 1 to 2 | bom.oom. |
| 30 | ·650 | ·680 | ·671 | 38·0 | 31·5 | 34·458 | 32·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW | 1 to 2 | bc.bom. |
| Max. | 30·160 | 30·180 | 30·180 | 58·0 | ... | ... | 40·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N to NE 10 / E to SE 8 / W to SW 5 | | |
| Min. | 29·440 | 29·450 | 29·440 | ... | 27·5 | ... | 31·041 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N to NW 10 / S to SE 4 / W to NW 3 | | |
| Mean | 29·844 | 29·528 | 29·935 | ... | ... | 33·224 | 34·395 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E to NE 9 / S to SW 5 / Calm . 16 | | |

# JULY, 1852.

*Melville Bay; Baffin's Bay.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | Lower Deck. | | | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| July 1 | 29·660 | 29·650 | 29·664 | 34·0 | 31·5 | 32·666 | 31·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, SSW | 1 to 2 | b c m. o m s. |
| 2 | ·800 | ·730 | ·730 | 35·5 | 32·0 | 33·125 | 31·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW | 2 to 4 | o m s. o c. o c m. |
| 3 | ·900 | ·840 | ·851 | 37·5 | 34·0 | 34·833 | 31·791 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, S | 2 to 4 | o c m. b c. o m s. |
| 4 | ·860 | ·890 | ·878 | 40·0 | 35·0 | 36·333 | 32·041 | ... | ... | ... | ... | ... | ... | ... | ... | ... | South | 2 | o m s. b c. |
| 5 | ·670 | ·720 | ·746 | 41·0 | 34·0 | 37·375 | 32·125 | ... | ... | ... | ... | ... | ... | ... | ... | ... | South | 2 | b c. |
| 6 | ·570 | ·600 | ·621 | 40·0 | 34 5 | 36·333 | 32·791 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, SW | 2 to 4 | b c. c. c m. |
| 7 | ·590 | ·450 | ·512 | 36·5 | 32·5 | 34·333 | 33·041 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, SW by S | 4 to 5 | c m. c o m. |
| 8 | ·650 | ·600 | ·595 | 35·0 | 33·0 | 34·125 | 32·291 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW by S, SW | 4 | c o m. c o r m. s. |
| 9 | ·550 | ·630 | ·617 | 38·0 | 34·0 | 34·958 | 33·083 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, SSW | 2 to 5 | c o m s. |
| 10 | ·650 | ·500 | ·539 | 37·0 | 34·5 | 35·625 | 34·000 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SSW, S, SW | 2 to 5 | o c m. b c. o c r. |
| 11 | ·830 | ·830 | ·803 | 36·5 | 32·5 | 34·008 | 33·008 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, SSW | 4 to 5 | o m. b m. o. |
| 12 | ·820 | ·820 | ·823 | 36·0 | 35·0 | 35·666 | 33·458 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SSW | 4 to 5 | o. c d. |
| 13 | ·900 | ·850 | ·863 | 40·5 | 30·0 | 33·909 | 30·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, calm, NNW | 1 to 4 | o d. c. b c. |
| 14 | ·940 | ·910 | ·917 | 45·0 | 35·0 | 38·208 | 35·458 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNW, N | 1 to 4 | b c. b c m. |
| 15 | ·730 | ·820 | ·810 | 38·5 | 32·0 | 35·166 | 33·625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | North | 2 to 4 | b c m. b c. |
| 16 | ·830 | ·750 | ·764 | 41·0 | 32·5 | 36·791 | 32·958 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N, NNE, NE | 1 to 4 | b c. b c r. |
| 17 | 30·000 | ·920 | ·917 | 38·0 | 34·0 | 35·750 | 32·750 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, S, SW | 1 to 3 | b c. c o. b c m. |
| 18 | ·050 | 30·000 | 30·015 | 37·5 | 34·0 | 35·791 | 32·833 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, calm | 0 to 3 | b c m. |
| 19 | 29·900 | 29·990 | 29·993 | 38·0 | 31·0 | 34·333 | 32·666 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, calm | 0 to 3 | b c m. c m. b c. b. |
| 20 | ·760 | ·820 | ·813 | 41·0 | 34·0 | 37·750 | 32·833 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, NW, N | 0 to 2 | b. b c. |
| 21 | ·750 | ·700 | ·723 | 41·0 | 33·5 | 37·500 | 32·750 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N, NW | 1 to 3 | b c. c. o c g. o c g d. |
| 22 | ·900 | ·840 | ·840 | 37·0 | 32·0 | 34·333 | 31·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, E, calm | 0 to 3 | o c g d. o c. o c m. f. |
| 23 | ·700 | ·800 | ·782 | 38·0 | 31·0 | 34·500 | 32·375 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, E | 0 to 2 | f. |
| 24 | ·720 | ·680 | ·701 | 38·5 | 30·5 | 35·416 | 32·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, calm | 0 to 2 | f. b c f. b c. |
| 25 | ·900 | ·820 | ·832 | 42·0 | 32·5 | 37·250 | 33·250 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, NE | 0 to 1 | b c. |
| 26 | ·960 | ·910 | ·919 | 38·0 | 31·0 | 36·041 | 33·166 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, E, SW | 1 to 3 | b c. |
| 27 | ·950 | ·960 | ·970 | 37·0 | 33·0 | 34·208 | 32·583 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, W, SW, S | 1 to 3 | b c. o f. o m. f d. o f. |
| 28 | ·820 | ·860 | ·879 | 34·0 | 32·0 | 33·000 | 32·300 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, calm, SSW, W, WNW | 0 to 3 | c f. o m. o f. |
| 29 | ·850 | ·820 | ·818 | 38·0 | 29·0 | 34·083 | 32·166 | ... | ... | ... | ... | ... | ... | ... | ... | ... | WNW, calm, NW, SE | 0 to 1 | o f. c m. o m d. f. |
| 30 | ·940 | ·870 | ·906 | 37·0 | 31·0 | 32·791 | 32·250 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SE, E, NE, calm, NW, SE | 0 to 2 | f. b c. o. |
| 31 | ·810 | ·880 | ·868 | 39·0 | 34·0 | 36·083 | 33·875 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm, NNE, N, S, SW | 0 to 3 | b c. o. b. o c. |
| Max. | 30·050 | 30·000 | ... | 45·0 | ... | ... | 35·458 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N to NE 6 | E to SE 2 | W to SW 3 | |
| Min. | 29·550 | 29·450 | ... | ... | 29·0 | ... | 30·541 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N to NW 7 | S to SE 7 | W to NW 6 | |
| Mean | 29·808 | 29·789 | 29·797 | ... | ... | 35·235 | 34·837 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E to NE 3 | S to SW 16 | Calm . 11 | |

# AUGUST, 1852.

*Part in Baffin's Bay* (1*st to* 16*th*), *the remainder in Northumberland Sound* (17*th to* 31*st*).

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | | Shore. | | | Lower Deck. | | Lower Deck. | | | | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Mean Sea. | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | Spirit Room. | Direction. | Force. | |
| Aug. 1 | 29·670 | 29·780 | 29·749 | 38·0 | 3·20 | 33·666 | 33·708 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, NW, SW, S, SE | 1 to 8 | c. c o s. |
| 2 | ·680 | ·630 | ·638 | 35·0 | 33·5 | 34·333 | 35·333 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ESE, ENE, NE | 2 to 6 | c o s. o e q. o q d. s. |
| 3 | ·680 | ·670 | ·648 | 35·0 | 34·0 | 34·416 | 34·958 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N by W, NNE, NE by N | 5 to 7 | o q s. o c. o q d. |
| 4 | ·670 | ·630 | ·645 | 37·5 | 34·5 | 35·458 | 34·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N by W, NNE, NE by N | 3 to 7 | o q s. o c. b c. |
| 5 | ·560 | ·640 | ·627 | 37·0 | 34·5 | 35·541 | 35·708 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, NNE, NW | 1 to 5 | o c q. c. c d. |
| 6 | ·500 | ·500 | ·511 | 36·0 | 33·0 | 35·500 | 36·000 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, N, E, ESE | 1 to 6 | o m s. r. g. f. o f d. |
| 7 | ·620 | ·520 | ·556 | 37·0 | 33·0 | 35·375 | 34·250 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SE, SSW, S, calm, E, ENE | 0 to 5 | o c q. b c. c. |
| 8 | ·800 | ·600 | ·644 | 41·0 | 36·0 | 36·916 | 37·625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNW, NNE, NE, calm, SW | 0 to 3 | b c. |
| 9 | ·980 | ·900 | ·906 | 41·0 | 35·0 | 37·833 | 37·208 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, calm, NW, NE, S, NW | 0 to 2 | b c. f. |
| 10 | ·910 | ·940 | ·942 | 38·0 | 34·0 | 35·916 | 35·625 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW by N, NE by N, W, SW | 1 to 2 | b c r. c. o c. |
| 11 | ·650 | ·880 | ·777 | 38·0 | 31·0 | 34·909 | 33·227 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, SE, SSW, S, E | 1 to 3 | b c. c. |
| 12 | ·700 | ·660 | ·659 | 40·5 | 34·0 | 37·541 | 33·666 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNE, E | 2 to 5 | o c. b c. b c q. |
| 13 | ·720 | ·720 | ·722 | 45·0 | 38·0 | 40·458 | 35·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE | 2 | b c. |
| 14 | ·700 | ·720 | ·712 | 42·0 | 37·0 | 38·750 | 34·875 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, calm | 0 to 2 | b c. m. |
| 15 | ·620 | ·660 | ·656 | 40·0 | 35·0 | 37·681 | 35·227 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE by E, E by N | 1 to 3 | b c. |
| 16 | ·520 | ·600 | ·586 | 40·0 | 34·0 | 36·833 | 33·750 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NNW, E by N, calm, N, S | 0 to 2 | b c. c. |
| 17 | ·430 | ·440 | ·449 | 35·0 | 28·0 | 31·791 | 31·208 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, SW, W | 1 to 4 | o c. c. b. m s. |
| 18 | ·370 | ·340 | ·356 | 32·5 | 29·0 | 30·750 | 31·083 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm, NE | 0 to 3 | f s. c s. c o s. m. |
| 19 | ·500 | ·460 | ·455 | 30·5 | 22·5 | 26·300 | 29·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, N, NW | 2 to 5 | o c. m. s. |
| 20 | ·500 | ·460 | ·565 | 31·0 | 26·0 | 28·700 | 29·300 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm, ESE, SSE | 0 to 2 | c s. c. b c. |
| 21 | ·950 | ·880 | ·883 | 31·0 | 23·0 | 25·708 | 28·545 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SSE, NE, N, NNE | 1 to 4 | b c. c m. c f. |
| 22 | ·950 | ·990 | ·977 | 26·0 | 22·0 | 24·041 | 29·833 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE | 2 | c f. m. b c m. |
| 23 | ·800 | ·890 | ·860 | 27·0 | 23·0 | 24·700 | 29·850 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE | 2 to 4 | b c m. c s. o c s. |
| 24 | ·720 | ·720 | ·731 | 27·5 | 24·0 | 25·750 | 30·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE | 2 to 3 | o c s. s. |
| 25 | ·860 | ·800 | ·820 | 30·5 | 21·0 | 25·375 | 30·291 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, SE, SSE, ENE | 1 to 3 | s. c s. b c. |
| 26 | ·650 | ·820 | ·785 | 31·0 | 27·0 | 27·916 | 30·416 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, E, SE, E | 0 to 3 | b c. |
| 27 | ·500 | ·520 | ·531 | 28·5 | 23·0 | 26·000 | 30·375 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, ESE | 2 to 3 | c. o c. b c. |
| 28 | ·870 | ·720 | ·700 | 28·0 | 22·0 | 25·250 | 30·105 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE | 2 to 3 | o c. b c. |
| 29 | ·750 | ·860 | ·825 | 27·5 | 23·0 | 25·416 | 30·208 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NE, NNE | 1 to 3 | b c. o c. c. o s. |
| 30 | ·830 | ·760 | ·772 | 30·0 | 26·0 | 27·700 | 30·250 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm | 0 to 1 | o s. o m s. |
| 31 | ·570 | ·750 | ·719 | 31·0 | 26·0 | 27·083 | 30·208 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm | 0 to 1 | o s. o m s. |
| Max. | 29·950 | 29·990 | ... | 35·0 | ... | ... | 31·208 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N to NE 20 | E to SE 7 | W to SW 2 | |
| Min. | 29·370 | 29·340 | ... | ... | 21·0 | ... | 28·545 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N to NW 11 | S to SE 5 | W to NW 1 | |
| Mean | 29·683 | 29·693 | 29·695 | ... | ... | 26·832 | 30·111 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E to NE 11 | S to SW 6 | Calm 10 | |

# SEPTEMBER, 1852.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | Lower Deck. | | | Spirit Room. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| Sep. 1 | 29·620 | 29·440 | 29·444 | 37·0 | 18·0 | 26·416 | 30·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm, ESE, E | 0 to 3 | o s. o m. |
| 2 | ·750 | ·700 | ·717 | 26·0 | 21·0 | 22·875 | 30·125 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, NE | 1 to 4 | o m. o g. b c. |
| 3 | ·800 | ·780 | ·791 | 22·0 | 22·0 | 22·000 | 30·100 | ... | ... | ... | ... | ... | ... | ... | ... | ... | East | 1 | b c. |
| 4 | ·740 | ·760 | ·767 | 22·0 | 16·0 | 18·300 | 29·944 | ... | ... | ... | ... | ... | ... | ... | ... | ... | E, NNE, calm | 0 to 4 | o m. |
| 5 | ·650 | ·700 | ·710 | 26·5 | 20·0 | 21·600 | 30·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm | 0 | o m. o f. |
| 6 | ·800 | ·650 | ·700 | 28·5 | 24·0 | 26·350 | 30·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm | 0 | o m s. b c. |
| 7 | 30·100 | ·920 | ·923 | 26·0 | 19·0 | 21·636 | 30·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm | 0 | b c. c. |
| 8 | ·100 | 30·160 | 30·140 | 26·0 | 6·0 | 15·590 | 31·000 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm | 0 | c. |
| 9 | 29·980 | ·000 | ·013 | 21·0 | 4·5 | 14·791 | 31·333 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, SE | 0 to 3 | b. o. o c. |
| 10 | 30·140 | ·050 | ·063 | 16·0 | 8·0 | 10·833 | 30·000 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SE, E, calm, S | 0 to 3 | o c. c s. |
| 11 | ·162 | ·170 | ·174 | 24·0 | 17·0 | 18·588 | 30·000 | ... | ... | ... | ... | ... | ... | ... | ... | ... | N, NW, W | 1 to 2 | s. c. b c. |
| 12 | ·010 | ·102 | ·081 | 24·0 | 20·0 | 22·181 | 29·909 | ... | ... | ... | ... | ... | ... | ... | ... | ... | W, SSE, SE | 2 to 4 | c. o c. |
| 13 | 29·920 | 29·950 | 29·950 | 24·0 | 22·0 | 22·875 | 29·916 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SE, S | 3 to 5 | o c. c q. |
| 14 | ·760 | ·820 | ·808 | 24·0 | 19·0 | 23·000 | 29·875 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, calm | 0 to 2 | c o. o. |
| 15 | 30·010 | ·860 | ·866 | 23·5 | 19·5 | 21·166 | 29·750 | ... | ... | ... | ... | ... | ... | ... | ... | ... | Calm, SW, S | 0 to 6 | c. o q s. o. |
| 16 | 29·860 | ·980 | ·944 | 26·0 | 21·0 | 24·950 | 29·800 | ... | ... | ... | ... | ... | ... | ... | ... | ... | S, SW, SW by W | 3 to 7 | c s. o s. |
| 17 | ·900 | ·860 | ·869 | 24·5 | 10·0 | 12·708 | 29·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW by W, SW, WSW, W | 3 to 4 | o s. b c. o c. o. |
| 18 | 30·062 | 30·080 | 30·046 | 11·0 | 6·0 | 8·900 | 29·500 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, W, SW | 1 to 4 | o. o c. o. c. |
| 19 | 29·990 | ·030 | ·015 | 15·0 | 12·0 | 14·055 | 29·277 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW | 1 to 2 | o. c. b c. |
| 20 | ·750 | 29·900 | 29·877 | 20·0 | 14·0 | 16·333 | 29·416 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, W, SW, S | 1 to 4 | c. o c m. |
| 21 | ·900 | ·800 | ·813 | 19·0 | 10·0 | 13·181 | 29·318 | ... | ... | ... | ... | ... | ... | ... | ... | ... | SW, WNW, NW | 1 to 5 | o s. o c. |
| 22 | ·860 | ·900 | ·895 | 11·0 | 8·0 | 9·950 | 29·350 | ... | ... | ... | ... | ... | ... | ... | ... | ... | NW, calm | 0 to 2 | o c. o. |
| 23 | ·680 | ·780 | ·747 | 17·5 | 9·0 | 12·750 | 29·312 | ... | ... | ... | ... | ... | ... | ... | ... | ... | North | 2 to 6 | c. o c. o c q. |
| 24 | ·580 | ·660 | ·643 | 18·0 | 1·0 | 13·625 | 29·500 | ... | ... | ... | 57·5 | 50·75 | ... | ... | ... | ... | N, NE | 4 to 8 | o c q. b c. |
| 25 | ·680 | ·640 | ·644 | 8·0 | 2·0 | 3·875 | 29·500 | ... | ... | ... | 57·6 | 52·00 | ... | ... | ... | ... | N, NE | 1 to 3 | b c. |
| 26 | ·480 | ·680 | ·630 | 29·5 | 7·0 | 17·750 | 29·500 | ... | ... | ... | 59·3 | 51·60 | ... | ... | ... | ... | E, ENE | 1 to 6 | b c. c. o c q. o q. |
| 27 | ·270 | ·370 | ·361 | 32·0 | 28·0 | 30·583 | 29·500 | ... | ... | ... | 56·3 | 53·00 | ... | ... | ... | ... | East | 1 to 6 | o s. b. o. o c. |
| 28 | ·460 | ·410 | ·380 | 28·0 | 18·0 | 21·333 | 29·500 | ... | ... | ... | 59·5 | 54·00 | ... | ... | ... | ... | S, calm, NE | 0 to 7 | o s. c. b c. o c. b c q. |
| 29 | ·650 | ·580 | ·567 | 24·0 | 20·0 | 22·416 | 29·500 | ... | ... | ... | 54·5 | 50·10 | ... | ... | ... | ... | NE, SE | 5 to 7 | b c q. c q. o q. |
| 30 | ·950 | ·770 | ·795 | 24·0 | 23·0 | 23·291 | 29·500 | ... | ... | ... | 59·3 | 53·60 | ... | ... | ... | ... | SE, S, calm | 0 to 6 | b c q. o c. c. b c. |
| Max. | 30·160 | 30·170 | ... | 37·0 | ... | ... | 31·333 | | | | | | | | | | | | |
| Min. | 29·270 | 29·370 | ... | ... | 1·0 | ... | 29·277 | | | | | | | | | | | | |
| Mean | 29·820 | 29·817 | 29·812 | ... | ... | 18·463 | 29·894 | | | | | | | | | | | | |

# OCTOBER, 1852.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | Lower Deck. | | | Spirit Room. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | | |
| Oct. 1 | 29·760 | 29·990 | 29·997 | 24·5 | 19·0 | 20·625 | 29·500 | 24·5 | 20·0 | 19·89 | 61·00 | 55·66 | ... | ... | ... | ... | SE, S | 2 to 6 | bc. c. o s q. |
| 2 | ·500 | ·700 | ·642 | 23·0 | 5·0 | 12·636 | 29·500 | 24·5 | 5·0 | 14·18 | 60·33 | 54·00 | ... | ... | ... | ... | S, SSW, calm | 0 to 4 | o q. b c. |
| 3 | ·560 | ·550 | ·547 | 9·0 | 2·0 | 5·958 | 29·500 | 9·0 | 3·0 | 6·33 | 60·33 | 53·00 | ... | ... | ... | ... | West | 4 to 7 | o c. o c q. o c g. |
| 4 | ·920 | ·750 | ·845 | 7·0 | 2·0 | 4·458 | 29·500 | 7·0 | 2·0 | 4·46 | 58·33 | 52·00 | ... | ... | ... | ... | W, WNW, NW | 2 to 6 | o g s. b c. |
| 5 | ·860 | ·880 | ·890 | 7·0 | 3·5 | 4·416 | 29·500 | 5·3 | 3·0 | 4·08 | 58·66 | 52·33 | ... | ... | ... | ... | NW, W. | 1 to 2 | b c. o s. c. |
| 6 | ·890 | ·850 | ·859 | 9·0 | -7·0 | - ·291 | 29·500 | 9·0 | -6·5 | -1·00 | 57·66 | 52·33 | ... | ... | ... | ... | NW, calm | 0 to 2 | o c. b c. |
| 7 | ·920 | ·850 | ·871 | -5·0 | -14·0 | -9·200 | 29·500 | -11·0 | -16·0 | -13·75 | 54·00 | 48·66 | ... | ... | ... | ... | NW | 2 | b c. |
| 8 | 30·074 | 30·050 | 30·054 | -2·0 | -3·5 | -2·500 | 29·500 | 11·0 | 3·0 | 5·25 | 50·00 | 46·00 | ... | ... | ... | ... | NW, calm, N | 0 to 4 | c. o. s. |
| 9 | ·225 | ·100 | ·131 | -2·0 | -4·5 | -3·416 | 29·500 | 7·0 | -3·5 | 3·52 | 47·00 | 43·66 | ... | ... | ... | ... | N | 3 | o. o s. |
| 10 | ·413 | ·320 | ·366 | 6·5 | -5·0 | -0·166 | 29·500 | 12·0 | -3·5 | 5·30 | 50·66 | 46·66 | ... | ... | ... | ... | N, calm | 0 to 3 | o. |
| 11 | ·460 | ·300 | ·412 | 6·0 | -6·5 | -0·875 | 29·500 | 23·0 | 12·0 | 15·60 | 51·66 | 47·33 | ... | ... | ... | ... | Calm, W, NW, N | 0 to 1 | o. b c. |
| 12 | ·310 | ·450 | ·395 | 1·0 | -8·0 | -4·250 | 29·500 | 1·0 | -8·0 | -4·23 | 49·00 | 45·16 | ... | ... | ... | ... | N, NW | 1 to 2 | b c. |
| 13 | ·260 | ·250 | ·306 | 2·0 | -7·5 | -1·250 | 29·500 | 3·5 | -8·0 | -1·00 | 47·66 | 44·00 | ... | ... | ... | ... | N, NE | 2 to 4 | o. o c m. b c f. |
| 14 | ·038 | ·120 | ·137 | -8·0 | -15·5 | -11·291 | 29·000 | -5·0 | -17·0 | -10·16 | 44·33 | 41·50 | ... | ... | ... | ... | NE, calm | 0 to 4 | b c f. b c. o. m. b. |
| 15 | 29·932 | ·050 | ·028 | -17·0 | -20·5 | -19·500 | 29·000 | -12·0 | -22·0 | -17·94 | 41·33 | 38·83 | ... | ... | ... | ... | NE, NW | 1 to 3 | o c. b m. b c m. |
| 16 | ·760 | 29·820 | 29·824 | -4·0 | -15·5 | -8·958 | 29·000 | -3·0 | -15·0 | 8·33 | 44·00 | 41·50 | ... | ... | ... | ... | NW | 2 to 3 | b c m. c m. |
| 17 | ·630 | ·692 | ·682 | -6·0 | -8·5 | -7·250 | 29·000 | -4·0 | -9·5 | 6·00 | 48·00 | 44·66 | ... | ... | ... | ... | NW, calm, S | 0 to 3 | c m. o. o m. c. |
| 18 | ·650 | ·628 | ·628 | -5·0 | -7·0 | -6·083 | 29·000 | 4·0 | 8·5 | 5·60 | 47·50 | 45·16 | ... | ... | ... | ... | S, calm | 0 to 3 | c. m. |
| 19 | ·742 | ·740 | ·718 | 2·5 | -8·0 | -4·379 | 29·000 | 0·5 | -5·5 | 2·27 | 48·33 | 44·33 | ... | ... | ... | ... | Calm, NW | 0 to 1 | m. o m. |
| 20 | ·872 | ·840 | ·840 | 10·5 | 1·5 | 7·458 | 29·000 | 11·0 | 2·0 | 7·65 | 53·50 | 49·50 | ... | ... | ... | ... | NW, N | 1 to 3 | o m. b c. |
| 21 | ·866 | ·820 | ·825 | 13·0 | 6·0 | 10·166 | 29·000 | 13·5 | 1·5 | 9·83 | 52·50 | 49·00 | ... | ... | ... | ... | N, NNE, NE | 2 to 5 | b c. |
| 22 | ·900 | ·780 | ·810 | 8·5 | -5·0 | 3·291 | 29·500 | 2·5 | -6·5 | -3·70 | 49·66 | 46·66 | ... | ... | ... | ... | NE, N | 1 to 2 | b c. |
| 23 | 30·000 | 30·012 | ·995 | -4·0 | -12·5 | -9·125 | 29·500 | -6·0 | -10·5 | -8·30 | 44·50 | 42·16 | ... | ... | ... | ... | North | 1 | b c. m. |
| 24 | 29·990 | 29·988 | ·984 | -3·5 | -7·5 | -5·291 | 29·000 | -2·0 | 7·5 | 4·42 | 48·83 | 46·00 | ... | ... | ... | ... | N, NW | 1 to 2 | m c. |
| 25 | ·883 | ·962 | ·948 | 0·5 | -7·5 | -3·291 | 29·000 | 1·0 | -7·5 | -3·00 | 51·00 | 48·00 | ... | ... | ... | ... | N, NW | 1 to 2 | c. c m. |
| 26 | ·886 | ·870 | ·881 | 3·0 | -8·0 | -4·375 | 29·000 | 3·0 | -8·5 | -3·30 | 47·33 | 45·00 | ... | ... | ... | ... | NW | 1 to 2 | o m. c. o. b. |
| 27 | 30·184 | ·950 | 30·010 | -2·5 | -6·0 | -3·833 | 29·000 | -3·0 | -8·5 | -4·06 | 48·00 | 45·00 | ... | ... | ... | ... | NW, W | 1 | b. b c. m. o. |
| 28 | ·390 | 30·280 | ·313 | -1·0 | -5·0 | -2·500 | 29·000 | -1·0 | -5·0 | -2·62 | 50·50 | 46·25 | ... | ... | ... | ... | West | 1 to 2 | o. |
| 29 | ·278 | ·400 | ·380 | -2·0 | -10·0 | -5·500 | 29·000 | -2·0 | -11·5 | -5·87 | 50·33 | 45·66 | ... | ... | ... | ... | W, N, N by W, NE | 2 | o. b c. |
| 30 | ·104 | 29·936 | ·038 | 3·0 | - 7·0 | -1·666 | 29·000 | 1·0 | -6·0 | -2·30 | 45·33 | 41·66 | ... | ... | ... | ... | NE | 2 to 6 | b c. o sleet, drift, c. |
| 31 | ·380 | 30·283 | ·268 | -4·0 | -18·0 | -12·875 | 29·125 | 4·0 | 18·0 | -12·87 | 47·33 | 43·83 | ... | ... | ... | ... | NE, WNW, calm, NNW | 0 to 5 | c. b. |
| Max. | 30·460 | 30·450 | ... | 24·5 | ... | ... | 29·500 | 25·0 | ... | ... | 61·00 | | | | | | | | |
| Min. | 29·500 | 29·550 | ... | ... | -20·5 | ... | 29·000 | ... | -24·0 | ... | 41·33 | | | | | | | | |
| Mean | 29·985 | 29·975 | 29·985 | ... | ... | -20·211 | 29·214 | ... | ... | -1·40 | 50·50 | | | | | | | | |

# NOVEMBER, 1852.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shor | | | Lower Deck. | | Lower Deck. | | | Spirit Room. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| Nov. 1 | 30·436 | 30·320 | 30·328 | −15·0 | −19·0 | −17·416 | 29·166 | −21·0 | −23·5 | −22·60 | 44·33 | 40·50 | ... | ... | ... | ... | WNW, NNE, calm | 0 to 2 | b. |
| 2 | ·200 | ·280 | ·251 | −18·0 | −26·0 | −22·375 | 29·000 | −18·0 | −26·0 | −20·20 | 43·25 | 39·50 | ... | ... | ... | ... | Calm, WNW, NW, NNE | 0 to 2 | b c. c. |
| 3 | ·200 | ·182 | ·186 | −20·0 | −26·0 | −23·458 | 29·166 | −24·0 | −28·0 | −24·06 | 42·16 | 41·00 | ... | ... | ... | ... | Calm, NW | 0 to 1 | b c. b. |
| 4 | ·300 | ·270 | ·269 | −20·0 | −24·0 | −21·875 | 29·250 | −22·0 | −27·5 | −25·46 | 42·50 | 39·50 | ... | ... | ... | ... | Calm, NW | 0 to 2 | b. |
| 5 | ·380 | ·400 | ·386 | −10·0 | −18·0 | −12·125 | 29·250 | −10·0 | −21·0 | −13·80 | 48·00 | 44·00 | ... | ... | ... | ... | NNE, S, SE, calm, NE | 0 to 2 | b c. c. |
| 6 | ·190 | ·380 | ·313 | −12·5 | −27·0 | −21·000 | 29·000 | −13·0 | −28·0 | −17·91 | 43·50 | 40·16 | ... | ... | ... | ... | NE, NNE, N, NW by N | 1 to 5 | c. b c. b. |
| 7 | ·028 | 29·980 | ·034 | −15·0 | −24·0 | −18·791 | 29·000 | −10·0 | −26·0 | −19·27 | 42·00 | 39·33 | ... | ... | ... | ... | NW by N, NNE, calm, N | 0 to 5 | m. b. b c. |
| 8 | *29·736* | *·884* | *29·851* | − 5·5 | −20·0 | −14·458 | 29·166 | − 6·0 | −19·5 | *15·84* | 40·50 | 37·00 | ... | ... | ... | ... | NE, NNE, N, NW | 4 to 6 | b c. c. c m. |
| 9 | ·831 | ·650 | ·714 | 19·0 | −10·0 | −2·916 | 29·500 | 20·0 | −10·0 | −4·00 | 40·33 | 36·83 | ... | ... | ... | ... | N, NE, NNE, ENE | 4 to 9 | c m. c m. m. q m. |
| 10 | 30·336 | ·960 | 30·047 | Zero | − 8·0 | −3·291 | 29·500 | 0·0 | −8·0 | −0·70 | 39·00 | 35·66 | ... | ... | ... | ... | SE, ESE | 9 to 10 | q m. m. |
| 11 | ·534 | 30·436 | ·462 | 1·0 | − 1·5 | Zero | 29·500 | 1·0 | −1·5 | 0·66 | 44·00 | 40·83 | ... | ... | ... | ... | ESE, SSE | 7 to 9 | m. q m. c q. o m. o q. |
| 12 | ·561 | ·632 | ·600 | 3·0 | Zero | 0·750 | 29·500 | 2·5 | −4·5 | 0·70 | 45·33 | 42·50 | ... | ... | ... | ... | SSE | 3 to 7 | o q. c q m. b m. |
| 13 | ·256 | ·320 | ·337 | 13·0 | − 2·0 | 5·500 | 29·500 | 13·5 | −1·0 | 3·90 | 47·66 | 45·00 | ... | ... | ... | ... | SSE, ESE | 3 to 5 | b m. b. c. o m. |
| 14 | ·576 | ·450 | ·453 | 12·5 | −10·0 | 2·916 | 29·000 | 13·0 | −14·0 | −4·20 | 47·66 | 45·50 | ... | ... | ... | ... | SE, SSE | 3 to 5 | o m. m. b c. |
| 15 | ·481 | ·472 | ·505 | 6·0 | −10·0 | −2·708 | 29·000 | 10·0 | 16·0 | −4·00 | 46·33 | 40·50 | ... | ... | ... | ... | SE, ENE | 2 to 4 | b c. |
| 16 | ·403 | ·430 | ·418 | 18·0 | 10·0 | 14·041 | 29·000 | 20·0 | 12·0 | 14·50 | 48·66 | 46·50 | ... | ... | ... | ... | SE | 4 to 6 | b c. c. m. |
| 17 | ·214 | ·336 | ·299 | 19·0 | 18·0 | 18·458 | 29·250 | 21·0 | 18·0 | 19·00 | 54·33 | 51·50 | ... | ... | ... | ... | SE, SSE | 2 to 5 | m. |
| 18 | ·120 | ·262 | ·185 | 19·0 | 17·0 | 18·166 | 29·000 | 18·0 | 11·0 | 14·56 | 54·33 | 52·33 | ... | ... | ... | ... | SSE, calm | 0 to 2 | m. |
| 19 | ·026 | ·080 | ·069 | 18·0 | 15·0 | 16·666 | 29·000 | 17·0 | 12·0 | 14·37 | 56·50 | 53·00 | ... | ... | ... | ... | SSE, SE | 2 to 5 | m. |
| 20 | 29·770 | 29·852 | 29·847 | 17·0 | 16·0 | 16·500 | 29·500 | 17·0 | 15·0 | 16·21 | 55·33 | 52·33 | ... | ... | ... | ... | SE, ESE, SSE | 4 to 5 | m. |
| 21 | ·750 | ·620 | ·664 | 16·5 | − 7·0 | 5·375 | 29·000 | 17·0 | − 9·0 | 3·00 | 50·00 | 47·66 | ... | ... | ... | ... | SSE, SE | 5 to 6 | m. c. |
| 22 | ·800 | ·914 | ·875 | −2·0 | −10·0 | −6·750 | 29·250 | −5·0 | −12·5 | −9·85 | 49·50 | 46·00 | ... | ... | ... | ... | SSE, SE | 4 to 6 | m. b c. |
| 23 | ·730 | ·700 | ·718 | −3·0 | −11·0 | −6·833 | 29·000 | −1·5 | −10·5 | −7·60 | 46·83 | 43·50 | ... | ... | ... | ... | SE, ENE | 4 to 5 | b c. |
| 24 | 30·051 | ·880 | ·895 | −3·0 | −10·5 | −7·041 | 29·333 | −5·0 | −11·0 | −9·85 | 48·50 | 45·50 | ... | ... | ... | ... | ENE, N, NW, N by W | 1 to 4 | b c. m. o. |
| 25 | ·130 | 30·120 | 30·115 | 2·0 | − 7·0 | −2·291 | 29·500 | 0·0 | − 7·0 | −3·63 | 47·66 | 45·00 | ... | ... | ... | ... | N by W, NW, SSE, SE | 0 to 2 | o. b c. |
| 26 | ·050 | ·120 | ·108 | 3·0 | − 6·0 | −0·833 | 29·875 | 0·5 | −11·0 | −5·50 | 48·66 | 46·16 | ... | ... | ... | ... | Calm, SE, E, ENE | 0 to 5 | b c. b. o. c. |
| 27 | 29·702 | 29·882 | 29·853 | 4·0 | − 2·0 | 1·833 | 29·500 | 4·5 | − 1·5 | 1·00 | 50·00 | 47·33 | 58·00 | 30·50 | ... | ... | ENE, NE | 5 | c. o. |
| 28 | ·500 | ·508 | ·537 | − 3·0 | −21·0 | −13·468 | 29·333 | − 1·5 | −22·0 | −14·80 | 47·66 | 44·50 | 50·33 | 31·00 | ... | ... | NE, NW | 4 to 5 | o. o q. b c. |
| 29 | ·885 | ·584 | ·606 | −20·0 | −24·0 | −22·125 | 29·325 | −24·0 | −26·5 | −24·69 | 43·33 | 41·00 | 46·33 | 30·50 | ... | ... | NW, W | 3 to 5 | b c. o. |
| 30 | ·840 | ·810 | ·777 | −20·0 | −28·0 | −24·208 | 29·250 | −20·0 | −29·5 | −27·50 | 40·00 | 38·00 | 45·00 | 30·50 | ... | ... | W, NW, WNW | 2 to 3 | b c. o. |
| Max. | 30·576 | 30·632 | ... | 19·0 | ... | ... | 29·875 | 21·0 | ... | ... | 56·50 | | | | | | | | |
| Min. | 29·500 | 29·508 | ... | ... | −27·0 | ... | 29·000 | ... | −29·5 | ... | 39·00 | | | | | | | | |
| Mean | 30·027 | 30·090 | 30·090 | ... | ... | −4·498 | 29·253 | ... | ... | −6·64 | 49·98 | | | | | | | | |

# DECEMBER, 1852.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | Winds. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | Lower Deck. | | | Spirit Room. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| Dec. 1 | 29·962 | 29·910 | 29·913 | −26·500 | −32·000 | −28·708 | 29·000 | −29·0 | −34·5 | −34·10 | 41·66 | 39·50 | 45·33 | ... | ... | 30·50 | WNW, N | 3 | o. bc. |
| 2 | ·990 | 30·000 | ·990 | −18·500 | −35·000 | −29·791 | 29·166 | −17·0 | −34·0 | −33·38 | 42·33 | 40·00 | 45·33 | ... | ... | 32·00 | Calm, NW | 0 to 3 | b. bc. |
| 3 | 30·041 | ·018 | 30·048 | −17·500 | −29·000 | −23·166 | 29·000 | −16·0 | −31·5 | −26·77 | 44·66 | 39·36 | 42·66 | ... | ... | 31·00 | Calm, ENE, WNW | 0 to 2 | bc. |
| 4 | ·014 | ·070 | ·055 | −30·000 | −35·000 | −32·666 | 29·000 | −31·0 | −35·0 | −35·23 | 53·00 | 50·33 | 48·33 | ... | ... | 32·00 | WNW, NWN, calm | 0 to 2 | bc. b. |
| 5 | ·080 | ·050 | ·049 | −29·000 | −32·000 | −30·958 | 29·300 | −29·0 | −35·5 | −33·81 | 46·16 | 44·00 | 47·00 | ... | ... | 32·00 | Calm, WNW, NE | 0 to 1 | b. |
| 6 | 29·950 | ·100 | ·040 | − 9·000 | −30·000 | −15·916 | 29·000 | − 9·5 | −34·4 | −18·36 | 44·66 | 42·00 | 47·66 | ... | ... | 32·00 | NE | 1 to 7 | b. bc. o. |
| 7 | ·896 | 29·914 | 29·916 | − 7·000 | −18·000 | − 9·916 | 29·000 | − 6·0 | −18·7 | −12·00 | 44·00 | 42·16 | 47·83 | ... | ... | 32·50 | NE, N by E, WSW | 2 to 7 | o. b. |
| 8 | ·900 | ·890 | ·898 | −19·500 | −31·000 | −25·541 | 29·000 | −19·0 | −35·1 | −27·50 | 39·00 | 36·75 | 42·00 | ... | ... | 32·00 | WSW, WNW | 2 to 4 | o. b. |
| 9 | ·841 | ·861 | ·867 | −30·000 | −34·000 | −32·250 | 29·000 | −30·0 | −37·5 | −35·37 | 42·75 | 39·25 | 46·83 | ... | ... | 31·50 | WNW | 2 to 4 | o. b. |
| 10 | ·926 | ·910 | ·933 | −26·000 | −33·500 | −30·458 | 29·000 | −30·0 | −38·0 | −35·80 | 40·33 | 37·33 | 45·00 | ... | ... | 30·00 | WNW, NW | 2 to 5 | b. |
| 11 | ·870 | ·950 | ·916 | −29·000 | −32·000 | −31·125 | 28·750 | −30·0 | −37·0 | −34·00 | 44·00 | 41·33 | 45·50 | ... | ... | 30·50 | WNW, NE, ENE | 2 to 3 | b. bc. |
| 12 | ·930 | ·882 | ·897 | −30·000 | −37·500 | −32·583 | 28·500 | −31·8 | −40·0 | −36·46 | 43·16 | 40·33 | 44·83 | ... | ... | 30·50 | WNW, NW, calm | 0 to 5 | b. bc. |
| 13 | ·850 | ·950 | ·913 | −31·500 | −38·000 | −34·583 | 29·000 | −34·3 | −40·3 | −38·46 | 41·33 | 38·83 | 44·33 | 39·00 | 43·00 | 30·00 | NW, WNW, calm | 0 to 4 | bc. |
| 14 | ·942 | ·824 | ·864 | −25·000 | −36·000 | −31·916 | 28·833 | −24·8 | −36·3 | −32·80 | 43·00 | 40·83 | 44·66 | 37·58 | 41·50 | 30·00 | WNW, calm, ENE, NNE | 0 to 5 | bc. b. |
| 15 | 30·362 | 30·101 | 30·194 | −32·000 | −37·000 | −34·625 | 28·833 | −31·8 | −42·0 | −36·80 | 45·50 | 44·33 | 45·75 | 40·75 | 41·00 | 30·00 | NE, W by S, calm, NWN | 0 to 2 | b. |
| 16 | ·440 | ·483 | ·456 | −34·000 | −39·000 | −36·666 | 28·833 | −34·8 | −42·0 | −38·13 | 48·33 | 47·00 | 47·16 | 44·00 | 41·08 | 31·00 | N, calm, NW | 0 to 2 | b. bc. |
| 17 | ·052 | ·276 | ·216 | −30·500 | −37·000 | −34·125 | 29·000 | −31·8 | −43·5 | −37·19 | 43·50 | 42·66 | 44·66 | 42·16 | 41·66 | 30·00 | Calm, E, SSW | 0 to 5 | bc. bcq. e. |
| 18 | ·080 | 29·980 | ·006 | −28·000 | −31·000 | −29·750 | 29·000 | −27·8 | −31·0 | −31·25 | 44·16 | 43·33 | 45·40 | 41·50 | 41·60 | 30·00 | SSW, SSE, SE | 5 to 7 | c. m. bc. o. |
| 19 | ·180 | 30·120 | ·126 | −26·000 | −27·500 | −26·916 | 29·000 | −26·0 | −28·6 | −27·25 | 46·16 | 45·00 | 46·75 | 43·50 | 42·41 | 31·00 | SSE, SE, S | 6 to 7 | m. bcm. bc. b. |
| 20 | ·206 | ·200 | ·192 | −25·000 | −29·000 | −27·791 | 29·000 | −26·5 | −31·3 | −28·17 | 47·50 | 46·33 | 46·25 | 43·41 | 42·66 | 30·00 | SE, SSE | 1 to 5 | b. bcq. bc. |
| 21 | ·150 | ·162 | ·159 | −29·000 | −39·000 | −34·291 | 29·000 | −32·0 | −37·0 | −33·30 | 48·00 | 47·00 | 46·66 | 44·00 | 44·83 | 31·00 | SSE, ESE, WNW, NNE | 1 to 2 | bc. b. |
| 22 | ·020 | ·120 | ·110 | −31·000 | −36·000 | −34·875 | 29·000 | −36·0 | −39·4 | −37·70 | 44·33 | 42·16 | 44·66 | 40·83 | 44·50 | 31·00 | NNE, E, NW | 1 to 2 | b. bc. |
| 23 | 29·570 | 29·720 | 29·720 | −32·000 | −39·000 | −35·708 | 29·000 | −37·0 | −40·8 | −38·75 | 49·50 | 48·25 | 47·25 | 44·33 | 39·50 | 30·00 | NW, calm, S | 0 to 2 | bc. b. |
| 24 | ·620 | ·613 | ·593 | −21·000 | −39·500 | −29·958 | 29·000 | −23·0 | −36·0 | −32·00 | 48·66 | 47·66 | 53·16 | 48·00 | 50·50 | 30·00 | SSW, calm | 0 to 2 | b. bc. |
| 25 | ·874 | ·700 | ·766 | −18·000 | −34·500 | −24·291 | 29·000 | −17·0 | −36·8 | −25·50 | 51·00 | 49·25 | 48·83 | 44·58 | 42·50 | 30·00 | Calm, ENE, WNW | 0 to 2 | bc. b. |
| 26 | 30·020 | ·960 | ·961 | −33·000 | −37·000 | −35·541 | 29·000 | −36·0 | −40·2 | −39·75 | 48·00 | 46·33 | 47·25 | 44·50 | 45·25 | 30·00 | WNW, calm, NNE, NNW | 0 to 1 | bc. b. |
| 27 | 29·933 | 30·020 | ·994 | −36·000 | −39·000 | −37·416 | 28·833 | −37·0 | −42·5 | −39·66 | 51·83 | 49·66 | 50·50 | 46·83 | 47·50 | 30·00 | NNW, NW, calm | 0 to 1 | b. bc. |
| 28 | ·652 | 29·722 | ·723 | −27·000 | −41·000 | −33·291 | 29·000 | −29·0 | −44·3 | −35·35 | 50·75 | 49·25 | 50·33 | 47·58 | 47·66 | 30·00 | Calm, SE | 0 to 6 | bc. bcm. bcq. mq. |
| 29 | ·488 | ·650 | ·604 | −26·000 | −30·000 | −27·333 | 29·000 | −26·0 | −32·5 | −27·15 | 50·00 | 48·33 | 50·16 | 47·41 | 45·33 | 31·00 | SE, ESE | 1 to 6 | mq. om. cm. bcq. |
| 30 | ·332 | ·390 | ·382 | −29·000 | −33·000 | −31·250 | 29·000 | −32·0 | −34·4 | −33·12 | 46·16 | 45·00 | 45·83 | 44·41 | 46·58 | 31·00 | S, SSE, SW | 2 to 5 | bc. bcq. cq. bc. |
| 31 | ·362 | ·280 | ·317 | −29·000 | −31·500 | −29·916 | 29·000 | −29·5 | −35·8 | −31·57 | 48·00 | 46·66 | 51·16 | 46·91 | 49·83 | 31·00 | SE, ESE | 1 to 4 | bc. cq. m. |
| Max. | 30·440 | 30·483 | ... | − 7·000 | ... | ... | 29·300 | − 6·0 | ... | ... | 53·00 | ... | 53·16 | 48·00 | 50·50 | 32·50 | | | |
| Min. | 29·332 | 29·280 | ... | ... | −41·000 | ... | 28·500 | ... | −46·7 | ... | 39·00 | ... | 42·00 | 39·00 | 39·50 | 30·00 | | | |
| Mean | 29·920 | 29·929 | 29·922 | ... | ... | −30·107 | 29·000 | ... | ... | −35·51 | 46·85 | ... | 47·32 | 43·75 | 44·15 | 30·75 | | | |

# JANUARY, 1853.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | |
| Jan. 1 | 29·424 | 29·364 | 29·380 | −24·0 | −29·0 | −26·500 | 28·75 | −23·5 | −31·5 | −27·00 | 46·00 | 44·50 | 51·33 | 49·00 | 54·91 | 32·00 | SE, ESE | 1 to 3 | m. o q. c. |
| 2 | ·458 | ·436 | ·439 | −19·0 | −24·0 | −22·125 | 29·00 | −20·0 | −26·0 | −22·33 | 51·00 | 50·00 | 50·33 | 47·58 | 48·66 | 32·50 | SE, NE, ENE, NW | 1 to 3 | c. cm. co. |
| 3 | ·700 | ·584 | ·599 | −23·0 | −36·5 | −30·208 | 29·00 | −26·0 | −42·0 | −34·80 | 50·16 | 46·00 | 49·00 | 47·33 | 46·91 | 32·00 | NW, NE, calm | 0 to 2 | m c. c. b cm. bc. |
| 4 | ·810 | ·760 | ·757 | −37·0 | −41·0 | −39·416 | 29·00 | −42·5 | −48·0 | −45·08 | 50·00 | 49·80 | 46·50 | 44·83 | 45·83 | 32·00 | Calm, NW, NNW | 0 to 1 | b c. b. |
| 5 | ·790 | ·822 | ·808 | −42·0 | −49·0 | −45·666 | 29·00 | −47·0 | −51·5 | −49·02 | 47·50 | 46·50 | 46·33 | 41·83 | 43·75 | 31·50 | NW, calm, W | 0 to 1 | b. b c. m. c. |
| 6 | ·734 | ·702 | ·712 | −34·5 | −48 0 | −37·958 | 29·00 | −37·0 | −49·0 | −38·01 | ... | ... | 42·83 | 39·83 | 39·66 | 31·00 | NW, calm, W | 0 to 1 | b c. m. c. |
| 7 | ·962 | ·854 | ·863 | −38·5 | −42·5 | −40·166 | 29·50 | −39·0 | −47·5 | −43·00 | ... | ... | 44·66 | 42·91 | 42·33 | 30·00 | NW | 1 | bc. b. |
| 8 | 30·074 | 30·050 | 30·034 | −40·0 | −46·0 | −43·208 | 29·50 | −46·5 | −50·0 | −47·97 | ... | ... | 46·25 | 44·00 | 46·50 | 31·00 | NW, WNW, WSW, SW | 1 to 4 | b. b m. c. b c. |
| 9 | ·020 | ·082 | ·042 | −42·0 | −56·0 | −51·750 | 29·50 | −49·5 | −56·0 | −54·17 | ... | ... | 45·00 | 43·83 | 44·25 | 31·00 | SW, calm, ENE | 0 to 1 | c. bc. b. |
| 10 | 29·954 | ·014 | 29·994 | −46·0 | −57·0 | −54·291 | 29·50 | −50·5 | −59·5 | −54·30 | ... | ... | 46·66 | 43·91 | 41·75 | 31·00 | ENE, calm, NE, NNE | 0 to 1 | b. b m. bc. |
| 11 | ·808 | 29·822 | ·798 | −52·0 | −56·5 | −54·625 | 29·50 | −53·5 | −59·5 | −56·25 | ... | ... | 47·66 | 45·16 | 42·66 | 30·00 | Calm, NE | 0 to 1 | b. bc. b m. |
| 12 | ·783 | ·850 | ·834 | −42·0 | −57·0 | −50·875 | 29·00 | −45·0 | −62·5 | −54·23 | ... | ... | 49·50 | 47·00 | 46·16 | 29·50 | Calm, NNW, SSE, SW | 0 to 2 | b m. b. |
| 13 | ·936 | ·822 | ·826 | −42·0 | −47·5 | −44·791 | 29·00 | −46·0 | −50·0 | −48·00 | ... | ... | 47·00 | 46·08 | 46·66 | 29·50 | SSE, SE, calm, S, SW | 0 to 2 | b m. bc. m. b. |
| 14 | 30·346 | 30·206 | 30·210 | −37·0 | −52·0 | −46·875 | 29·00 | −42·0 | −52·0 | −47·65 | ... | ... | 47·75 | 46·00 | 49·00 | 29·00 | SSE, calm, N | 0 to 1 | b. bc. b. m. |
| 15 | ·024 | ·312 | ·228 | −19·0 | −41·0 | −31·000 | 29·00 | −17·0 | −49·0 | −36·90 | ... | ... | 48·83 | 47·91 | 45·33 | 29·50 | N, calm, SW, SE | 0 to 6 | b. oc. b m. o q. |
| 16 | 29·612 | 29·760 | 29·748 | − 9·0 | −17·0 | −12·708 | 29·00 | −12·0 | −15·0 | −12·96 | 42·50 | 41·50 | 48·50 | 44·41 | 47·25 | 29·00 | SE, SSE, E | 6 to 8 | o q. q. c q. oc q. |
| 17 | ·760 | ·642 | ·668 | −13·5 | −36·0 | −22·125 | 29·00 | −13·0 | −35·0 | −24·75 | 48·50 | 47·00 | 50·16 | 46·83 | 47·83 | 29·00 | E, SE, SSE, calm, S | 0 to 6 | o q. oc q. om. o. c o. |
| 18 | ·740 | ·754 | ·756 | −25·0 | −40·0 | −31·541 | 29·00 | −27·0 | −40·0 | −33·70 | 46·90 | 45·50 | 46·91 | 46·66 | 49·58 | 29·00 | Calm, S, WNW, NNE | 0 to 3 | o m. b. b m. b c. |
| 19 | ·568 | ·650 | ·646 | −27·0 | −39·0 | −35·416 | 29·00 | −31·7 | −41·0 | −36·45 | 46·56 | 45·03 | 47·00 | 46·16 | 46·50 | 29·00 | NNE, SW, WSW, calm | 0 to 2 | bc. b m. b. o b. |
| 20 | ·562 | ·540 | ·548 | −36·0 | −46·0 | −40·916 | 29·00 | −37·5 | −47·5 | −43·75 | 45·33 | 44·00 | 46·87 | 46·58 | 47·58 | 29·50 | NE, S by E, S, NW, W | 1 to 5 | bc. b. b m q. |
| 21 | ·500 | ·553 | ·539 | −38·0 | −46·0 | −41·708 | 29·00 | −40·0 | −50·0 | −44·36 | 46·00 | 44·06 | 43·83 | 41·33 | 42·66 | 29·00 | NNW, NW, WNW | 2 to 5 | b m q. b c q. c q. o. |
| 22 | ·652 | ·521 | ·545 | −42·0 | −47·0 | −44·541 | 29·00 | −40·0 | −51·0 | −47·63 | 47·80 | 45·53 | 44·91 | 42·66 | 42·83 | 28·50 | WNW, NW, W, WSW | 1 to 3 | b c m. b. b h. b m. |
| 23 | ·850 | ·740 | ·682 | −37·0 | −49·0 | −41·166 | 29·00 | −39·0 | −52·0 | −47·12 | 42·50 | 40·75 | 44·33 | 42·91 | 44·33 | 29·50 | NW, NE, calm, NNE, S | 0 to 6 | bc. o bc. b. o q. |
| 24 | 30·140 | 30·056 | 30·055 | −32·0 | −41·0 | −36·791 | 29·00 | −32·0 | −42·0 | −37·20 | 45·60 | 43·60 | 45·58 | 43·08 | 42·33 | 28·50 | S, SW, SW by S, SSW, SSE | 5 to 7 | o q. oc q. b m. |
| 25 | 29·768 | 29·880 | 29·878 | −30·0 | −44·0 | −35·166 | 29·00 | −31·5 | −41·5 | −35·87 | 44·80 | 43·16 | 45·33 | 42·83 | 39·41 | 28·00 | SSE, SE, calm, NE | 0 to 7 | oq. oc. bm. om. bc. |
| 26 | ·730 | ·742 | ·739 | −45·0 | −47·0 | −45·541 | 29·00 | −41·5 | −48·0 | −45·33 | 45·63 | 43·73 | 46·16 | 43·50 | 41·50 | 29·00 | NE, calm | 0 to 1 | bc. oc. b. |
| 27 | ·532 | ·690 | ·645 | −36·0 | −45·0 | −39·083 | 29·00 | −39·0 | −45·0 | −41·19 | 44·10 | 42·25 | 45·41 | 44·16 | 43·41 | 29·00 | S, calm, N, W | 0 to 3 | b. bc. c o. bc m. |
| 28 | ·572 | ·576 | ·567 | −32·0 | −37·0 | −35·916 | 29·00 | −34·0 | −40·0 | −38·22 | 44·06 | 42·40 | 44·00 | 41·80 | 42·66 | 29·00 | W, NW, W, WNW | 1 to 3 | b c o. c o. b m. b c. c. |
| 29 | ·268 | ·246 | ·283 | −23·0 | −38·0 | −29·791 | 29·00 | −21·0 | −42·5 | −29·80 | 46·40 | 44·86 | 46·75 | 44·16 | 44·16 | 29·00 | WNW, S, calm, NW, N | 0 to 4 | c. cm. om. o m c. bc. |
| 30 | ·300 | ·400 | ·366 | −35·0 | −44·0 | −38·125 | 29·00 | −35·0 | −49·0 | −42·88 | 47·90 | 45·90 | 46·00 | 44·50 | 44·50 | 29·50 | N, NW, NE, W, SE | 1 to 2 | bc. c om. b cm. b m. |
| 31 | ·716 | ·400 | ·482 | −28·0 | −37·0 | −33·166 | 29·00 | −26·5 | −37·8 | −32·41 | 46·60 | 44·85 | 45·16 | 43·41 | 44·16 | 29·00 | SE, SSE, SSW, ENE | 1 to 4 | c om. o m. b. b cm. |
| Max. | 30·346 | 30·312 | ... | − 9·0 | ... | ... | 29·50 | −12·0 | ... | ... | 51·00 | ... | 51·33 | 49·00 | 54·91 | 32·50 | | | |
| Min. | 29·268 | 29·246 | ... | ... | −57·0 | ... | 28·75 | ... | −62·5 | ... | 42·50 | ... | 42·83 | 41·33 | 41·50 | 28·00 | | | |
| Mean | 29·743 | 29·737 | 29·736 | ... | ... | −38·162 | 29·01 | ... | ... | −40·00 | ... | ... | 46·66 | 44·90 | 44·81 | 29·34 | | | |

# FEBRUARY, 1853.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mea Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| Feb. 1 | 29·913 | 29·932 | 29·913 | −29·0 | −40·0 | −32·916 | 29·0 | −28·0 | −46·0 | −36·40 | 48·60 | 46·60 | 48·16 | 45·00 | 47·00 | 28·00 | ENE, NNE, NE, NW, N . | 1 to 3 | b. b m. b c. |
| 2 | 30·050 | 30·020 | 30·004 | −30·0 | −40·0 | −36·083 | 29·0 | −30·5 | −45·0 | −39·02 | 48·60 | 46·60 | 48·00 | 44·91 | 44·66 | 28·00 | NE, N, calm, E by N . . | 0 to 2 | b c. b. |
| 3 | ·300 | ·050 | ·127 | −26·0 | −41·0 | −35·041 | 29·0 | −28·5 | −45·0 | −37·48 | 46·66 | 45·13 | 47·66 | 44·75 | 43·50 | 29·00 | N, N by W, NE, calm, SE | 0 to 2 | b c. b m. o m. o m s. |
| 4 | ·670 | ·574 | ·576 | −20·0 | −30·0 | −25·833 | 29·0 | −19·0 | −28·5 | −25·75 | 49·00 | 46·80 | 47·66 | 45·83 | 44·16 | 28·00 | SE, NNE, N, NE . . . | 1 to 3 | c o m. b c m. c. b m. |
| 5 | ·490 | ·650 | ·617 | −17·0 | −33·0 | −22·208 | 29·0 | −15·0 | −35·0 | −22·00 | 51·06 | 48·66 | 50·33 | 47·91 | 46·58 | 27·50 | NE, N, ENE, N by E, NNE | 1 to 3 | b. c. b m c. c o. b q m. |
| 6 | ·100 | ·182 | ·243 | −22·0 | −33·0 | −27·208 | 29·0 | −22·5 | −34·5 | −28·83 | 48·66 | 47·25 | 47·25 | 45·08 | 45·83 | 28·00 | ENE, NW, NE, WSW, NNW | 1 to 2 | b m. b c. o m. c o. |
| 7 | ·354 | ·220 | ·248 | −23·0 | −30·0 | −25·333 | 29·0 | −24·0 | −32·0 | −26·85 | 50·40 | 48·16 | 49·16 | 46·66 | 46·33 | 28·00 | NNW, SSE, S, E, calm . | 0 to 2 | o m. c o. b c m. b m. |
| 8 | ·328 | ·300 | ·317 | −25·0 | −28·0 | −26·375 | 29·0 | −23·0 | −32·0 | −28·87 | 48·66 | 46·40 | 52·00 | 47·91 | 46·58 | 27·50 | S, calm, NE, SE, SSE . | 0 to 3 | b c. c. b c. b c m. |
| 9 | ·300 | ·350 | ·331 | −21·0 | −39·0 | −30·375 | 29·0 | −27·0 | −40·0 | −32·92 | 47·10 | 44·25 | 47·83 | 46·91 | 44·08 | 27·00 | SSE, SE by S, NE, NNE . | 1 to 2 | o c. b c. b m. b. |
| 10 | 29·892 | ·061 | ·042 | −28·0 | −39·0 | −34·090 | 29·0 | −27·5 | −43·0 | −36·21 | 46·00 | 43·83 | 45·83 | 43·41 | 44·66 | 28·00 | Calm, NE, N by W, NW, N | 0 to 7 | b. b c. b c o. c o q. |
| 11 | 30·120 | 29·710 | 29·838 | − 5·5 | −28·0 | −18·250 | 29·0 | − 5·0 | −32·0 | −19·60 | 44·43 | 42·33 | 45·08 | 43·83 | 45·83 | 28·00 | N, NE, SE, SSE . . . | 3 to 7 | b c q. o g. c o q s. o q. |
| 12 | ·260 | 30·294 | 30·272 | − 4·0 | −15·0 | − 9·958 | 29·0 | − 2·0 | −16·0 | − 9·85 | 50·40 | 47·26 | 47·00 | 47·00 | 44·66 | 28·00 | SSE, SE, E, calm, NE . . | 0 to 5 | b c. b m. o b c. b c m. |
| 13 | ·260 | ·280 | ·261 | − 2·0 | −20·0 | − 8·041 | 29·0 | 2·5 | −21·5 | − 8·94 | 49·86 | 46·50 | 48·00 | 46·66 | 48·00 | 28·00 | NE, calm . . . . . | 0 to 6 | o q. c o q. o c. b c q. |
| 14 | ·396 | ·361 | ·333 | − 1·0 | −21·0 | −17·541 | 29·0 | 0·0 | −23·5 | −14·27 | 48·46 | 45·26 | 46·50 | 47·16 | 47·66 | 28·00 | NE, NW . . . . . | 1 to 6 | b c q. o c g. b c. o q. |
| 15 | 29·684 | ·114 | ·002 | Zero | −30·0 | −12·083 | 29·0 | − 1·0 | −32·0 | −14·42 | 49·50 | 46·23 | 45·66 | 46·00 | 47·66 | 28·00 | NE, E, ENE, NW, W by N | 0 to 8 | b c q. c q. c o q. b q. |
| 16 | 30·014 | 29·760 | 29·818 | −27·0 | −32·0 | −29·416 | 29·0 | −28·0 | −34·0 | −31·00 | 47·83 | 42·93 | 46·50 | 47·16 | 47·16 | 27·00 | Calm, NW, SW . . . . | 0 to 2 | o o m. b c. b. b c m. |
| 17 | ·272 | 30·182 | 30·202 | −23·0 | −31·0 | −26·083 | 29·0 | −22·5 | −36·0 | −27·00 | 48·03 | 44·53 | 48·00 | 46·83 | 47·50 | 27·00 | Calm, SSE, SE . . . . | 0 to 4 | o s. o c. b c m. b c. |
| 18 | ·204 | ·274 | ·247 | −17·0 | −22·0 | −18·916 | 29·0 | −17·0 | −22·0 | −19·70 | 49·70 | 46·00 | 47·00 | 46·16 | 47·00 | 27·00 | SE, ESE, S, calm . . . . | 0 to 4 | b c q. o c q. b c. |
| 19 | ·144 | ·100 | ·107 | −15·0 | −20·0 | −17·000 | 29·0 | −15·0 | −21·0 | −17·08 | 47·76 | 45·20 | 48·50 | 45·50 | 44·83 | 26·50 | Calm, W by N, calm, S, SW | 0 to 3 | b c. c. b c m. o c. |
| 20 | ·500 | ·360 | ·382 | −24·0 | −43·0 | −37·166 | 29·0 | −21·5 | −44·5 | −37·54 | 46·86 | 42·53 | 45·91 | 43·00 | 46·66 | 26·00 | SW, W, NW, E, calm . . | 0 to 2 | b c. c. c m. |
| 21 | 29·972 | ·320 | ·255 | −32·0 | −44·0 | −40·083 | 29·0 | −39·0 | −45·5 | −42·38 | 44·53 | 41·13 | 42·75 | 40·50 | 42·83 | 25·50 | Calm, N by E, W, NW . . | 0 to 3 | b c. c. o c. b m. |
| 22 | ·642 | 29·650 | 29·684 | −28·0 | −42·0 | −38·125 | 29·0 | −36·0 | −43·0 | −40·75 | 44·70 | 42·16 | 42·66 | 41·08 | 41·66 | 25·00 | N, NNW, NW, calm, SSW | 0 to 2 | b c. o c. b m. |
| 23 | ·760 | ·758 | ·736 | −30·0 | −37·0 | −34·666 | 29·0 | −34·0 | −40·0 | −37·56 | 47·86 | 44·40 | 43·66 | 43·50 | 42·16 | 32·00 | SSW, calm, NW . . . . | 0 to 1 | b c. b. |
| 24 | ·782 | ·854 | ·821 | −29·0 | −40·0 | −35·500 | 29·0 | −25·0 | −41·0 | −37·00 | 45·73 | 42·60 | 43·66 | 41·00 | 43·83 | 32·00 | Calm, NE . . . . . | 0 to 2 | b c. |
| 25 | ·631 | ·624 | ·645 | −34·0 | −41·0 | −37·250 | 29·0 | −34·0 | −42·0 | −38·02 | 47·20 | 43·43 | 43·16 | 42·66 | 44·66 | 32·00 | Calm, SW, NW, N, WNW | 0 to 4 | b c. c m. b c. b c m. |
| 26 | ·928 | ·880 | ·850 | −36·0 | −41·0 | −39·333 | 29·0 | −37·0 | −47·0 | −42·00 | 46·83 | 42·20 | 44·00 | 42·16 | 45·00 | 33·00 | W, NW, calm, SSE, S . . | 0 to 4 | b c. c. b c m. c o m. |
| 27 | ·922 | ·890 | ·916 | −37·0 | −41·0 | −38·750 | 29·0 | −37·0 | −42·5 | −39·02 | 45·50 | 42·00 | 44·40 | 44·16 | 41·33 | 32·00 | S, SE . . . . . | 2 to 4 | b c, c o. b m. c m. |
| 28 | 30·130 | 30·010 | 30·037 | −24·0 | −40·0 | −35·750 | 29·0 | −34·0 | −44·0 | −37·77 | 46·96 | 43·76 | 42·00 | 42·66 | 45·25 | 35·00 | SE, S, S by W, calm . . . | 0 to 3 | c m. b c m. o c. b. |
| Max. | 30·670 | 30·650 | 30·617 | − 2·0 | ... | ... | 29·0 | 2·5 | ... | ... | 51·06 | ... | 52·00 | 47·91 | 48·00 | 35·00 | ... ... ... ... ... ... | 8 | |
| Min. | 29·631 | 29·624 | 29·645 | ... | −44·0 | ... | 29·0 | ... | −47·0 | ... | 44·43 | ... | 42·00 | 40·50 | 41·33 | 25·00 | | | |
| Mean | 30·108 | 30·098 | 30·101 | ... | ... | −28·045 | 29·0 | ... | ... | −29·58 | 47·67 | ... | 46·37 | 44·83 | 45·29 | 28·54 | ... ... ... ... ... ... | 3·93 | |

# MARCH, 1853.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | | |
| Mar. 1 | 29·960 | 30·120 | 30·085 | −25·0 | −43·0 | −33·625 | 29·00 | −24·0 | −43·0 | −34·85 | 42·73 | 39·30 | 40·00 | 40·08 | 43·16 | 34·0 | Calm, N, SE, SSE | 0 to 9 | b.c.ocb.ocg.og. |
| 2 | ·916 | 29·804 | 29·867 | −19·0 | −40·0 | −24·625 | 29·00 | −16·0 | −35·5 | −22·60 | 41·90 | 39·83 | 38·00 | 39·91 | 44·33 | 34·0 | SSE, SE, S, SW, WNW | 2 to 8 | oq.oc.bc.bcm. |
| 3 | 30·310 | 30·106 | 30·133 | −43·0 | −50·0 | −44·750 | 29·00 | −37·0 | −49·0 | −46·27 | 40·96 | 39·73 | 39·00 | 39·25 | 47·50 | 34·0 | WNW, NW, SW, W | 1 to 3 | bcm.bc.b.bm. |
| 4 | ·222 | ·232 | ·242 | −45·0 | −53·0 | −49·416 | 29·00 | −47·5 | −57·5 | −52·83 | 41·50 | 39·90 | 44·50 | 41·50 | 39·91 | 33·0 | NW, WNW, calm, W | 0 to 2 | bc.bcm.b. |
| 5 | ·254 | ·270 | ·251 | −47·5 | −53·0 | −50·125 | 29·00 | −49·5 | −55·8 | −52·29 | 41·13 | 39·50 | 42·16 | 39·33 | 38·33 | 33·0 | Calm, NW, WNW, NNE | 0 to 2 | bc.bcm.oc.c.bm. |
| 6 | ·024 | ·220 | ·163 | −28·0 | −51·5 | −45·208 | 29·00 | −48·0 | −55·5 | −51·96 | 39·70 | 38·25 | 42·83 | 39·66 | 38·83 | 33·0 | NW, S, calm | 0 to 2 | bc.bm. |
| 7 | ·300 | 29·940 | ·027 | −36·5 | −45·0 | −37·958 | 29·00 | −38·5 | −46·0 | −41·54 | 44·76 | 43·26 | 43·00 | 42·66 | 41·25 | 34·0 | Calm, N | 0 to 2 | bc.bm.cm.om.b. |
| 8 | 29·976 | 30·050 | ·033 | −31·0 | −40·0 | −35·250 | 29·00 | −31·5 | −40·5 | −36·83 | 47·46 | 45·36 | 44·66 | 44·66 | 43·66 | 34·0 | Calm, NE, N, ENE | 0 to 2 | bc.b.bm.bcm. |
| 9 | 30·000 | 29·990 | 29·990 | −30·0 | −38·0 | −34·833 | 29·00 | −29·5 | −40·0 | −35·08 | 48·50 | 46·05 | 45·16 | 44·66 | 48·66 | 34·0 | ENE, NNE, calm, NW, NE | 0 to 3 | bc.bm. |
| 10 | 29·916 | ·950 | ·938 | −37·0 | −42·0 | −39·000 | 29·00 | −34·0 | −46·0 | −39·94 | 46·83 | 44·43 | 41·66 | 44·50 | 47·50 | 34·0 | NW, N, W, calm | 0 to 3 | bc. |
| 11 | 30·110 | 30·028 | 30·021 | −32·0 | −42·0 | −36·750 | 29·00 | −34·5 | −40·5 | −38·13 | 47·33 | 45·23 | 47·50 | 43·83 | 43·33 | 33·0 | Calm, WNW, NE | 0 to 3 | bc.bcm. |
| 12 | ·170 | ·200 | ·168 | −29·0 | −40·0 | −36·416 | 29·00 | −31·0 | −40·0 | −37·64 | 49·83 | 47·50 | 47·50 | 46·33 | 45·58 | 33·0 | NE | 1 to 4 | bc.bcq.oqm.om. |
| 13 | ·350 | ·270 | ·285 | −18·0 | −30·0 | −25·416 | 29·00 | −14·0 | −33·0 | −26·50 | 50·93 | 48·33 | 48·33 | 47·75 | 46·83 | 33·0 | NE, SE, ESE | 1 to 8 | om.cs.bcq.bcs. |
| 14 | ·268 | ·240 | ·266 | −25·0 | −33·0 | −29·583 | 29·00 | −23·5 | −33·5 | −28·70 | 48·03 | 45·70 | 46·33 | 44·66 | 46·66 | 33·0 | ESE, SE, SSE | 6 to 10 | cq.oq.oqm. |
| 15 | ·350 | ·280 | ·302 | −17·0 | −23·0 | −18·958 | 29·00 | −16·0 | −23·0 | −19·06 | 48·96 | 46·50 | 46·16 | 47·16 | 47·00 | 33·0 | SSE, SE, S by E | 1 to 10 | oq.cq.bc. |
| 16 | ·170 | ·308 | ·225 | 6·0 | −20·0 | − 7·958 | 29·00 | 5·0 | −18·0 | − 8·47 | 48·73 | 46·50 | 46·66 | 42·91 | 47·33 | 33·0 | S by E, calm, E, NE by E | 0 to 2 | bc.o.cg. |
| 17 | 29·933 | 29·860 | 29·952 | 19·0 | 7·5 | 13·750 | 29·50 | 21·5 | 5·5 | 14·71 | 49·70 | 48·00 | 50·83 | 47·33 | 46·66 | 33·0 | NE by E, SE, S by E, SSE | 1 to 6 | o.co.os.cgs.ocq. |
| 18 | 30·106 | ·930 | ·981 | 14·0 | Zero | 4·875 | 29·50 | 14·5 | − 2·0 | 4·75 | 48·90 | 46·60 | 50·00 | 44·50 | 46·66 | 33·0 | SSE, SE, S | 3 to 9 | bc.bcq.bq.oq. |
| 19 | ·260 | 30·181 | 30·194 | 12·0 | 0·5 | 6·208 | 29·00 | −12·0 | 0·0 | 4·94 | 52·00 | 49·50 | 48·60 | 47·83 | 51·58 | 34·0 | SE, ESE, SW, E | 3 to 6 | bqm.c.co.bcq. |
| 20 | ·600 | ·386 | ·444 | 19·5 | 11·0 | 14·125 | 29·00 | −18·0 | 12·0 | 14·39 | 51·50 | 48·70 | 50·50 | 48·08 | 51·33 | 34·0 | SE | 1 to 6 | bcq.co.b. |
| 21 | ·506 | ·570 | ·542 | 22·0 | 10·0 | 16·166 | 29·00 | 24·0 | −10·0 | 16·58 | 52·46 | 49·40 | 48·08 | 49·66 | 53·00 | 34·5 | SE, NNE, calm, SSE | 0 to 5 | b.bc.obc.o. |
| 22 | ·500 | ·524 | ·519 | 18·0 | 10·0 | 12·791 | 29·00 | 22·0 | 7·5 | 13·48 | 51·53 | 47·80 | 44·50 | 47·41 | 53·33 | 34·0 | SSE, S, calm | 0 to 5 | o.bc.of. |
| 23 | ·474 | ·472 | ·473 | 12·0 | 1·0 | 5·833 | 29·50 | 14·0 | 0·5 | 5·54 | 49·16 | 45·40 | 44·41 | 45·83 | 55·66 | 34·5 | Calm, NNE, N, W by N | 0 to 3 | bc.cm.o.ob.of. |
| 24 | ·342 | ·426 | ·411 | 5·0 | −14·0 | −5·958 | 29·50 | 2·0 | −17·0 | −8·17 | 46·16 | 42·83 | 42·08 | 42·58 | 53·50 | 34·0 | WNW, calm, NW, SE | 0 to 2 | of.b.bcm.oc.bc. |
| 25 | ·000 | ·200 | ·159 | − 4·0 | −10·0 | −6·975 | 29·50 | −1·0 | −11·5 | −7·60 | 46·60 | 42·53 | 39·25 | 41·08 | 49·75 | 33·5 | SE, calm, S, SSE | 0 to 4 | oc.mg.cgs.ogs. |
| 26 | 29·764 | 29·812 | 29·805 | 4·5 | − 6·0 | −2·083 | 29·50 | 5·0 | − 7·0 | −2·69 | 45·93 | 42·60 | 39·08 | 42·41 | 48·16 | 34·0 | SSE, S, calm | 0 to 4 | ogs.co.bcm.cm. |
| 27 | ·720 | ·720 | ·727 | 3·0 | − 0·5 | 0·750 | 29·50 | 6·0 | − 1·5 | 1·12 | 44·06 | 40·73 | 37·58 | 42·00 | 50·33 | 33·0 | S, SSE, SE, calm | 0 to 2 | bc.oms.com.om. |
| 28 | ·840 | ·750 | ·776 | 3·0 | −14·0 | −8·541 | 29·50 | −9·0 | −15·0 | −7·44 | 48·65 | 45·00 | 41·91 | 44·66 | 51·33 | 32·5 | Calm, NE | 0 to 1 | om.oc.bc. |
| 29 | ·784 | ·872 | ·846 | 6·0 | −17·0 | −7·708 | 29·50 | 8·5 | −18·0 | −8·53 | 52·50 | 48·66 | 46·66 | 47·16 | 50·16 | 33·0 | Calm, SW, SE | 0 to 1 | bc.co.cf.com. |
| 30 | ·870 | ·722 | ·767 | 6·0 | −12·0 | −4·291 | 29·50 | 8·0 | −13·0 | −1·10 | 49·20 | 47·33 | 46·00 | 46·75 | 50·50 | 33·0 | SE, NE, NNE, NE by N | 1 to 4 | com.of.os.om. |
| 31 | 30·080 | 30·000 | 30·003 | 2·0 | −24·0 | −14·166 | 29·50 | −2·0 | −26·0 | −16·40 | 48·66 | 46·33 | 45·25 | 45·83 | 48·16 | 33·0 | NE by N, N, NNE, NW | 0 to 3 | cb.b.bco.bcm. |
| Max. | 30·600 | 30·570 | 30·542 | 22·0 | ... | ... | 29·50 | 24·0 | ... | ... | 52·50 | ... | 50·83 | 49·66 | 55·66 | 34·5 | ... ... ... ... | 10 | |
| Min. | 29·720 | 29·720 | 29·727 | ... | −53·0 | ... | 29·00 | ... | −55·8 | ... | 39·70 | ... | 37·58 | 39·25 | 38·33 | 32·5 | | | |
| Mean | 30·129 | 30·098 | 30·116 | ... | ... | 16·938 | 29·18 | ... | ... | −17·71 | 47·30 | ... | 44·42 | 44·26 | 47·42 | 33·5 | ... ... ... ... | 5·0 | |

# APRIL, 1853.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | Spirit Room. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| April 1 | 30·136 | 30·134 | 30·134 | −14·0 | −25·0 | −21·250 | 29·5 | −12·0 | −27·0 | −20·37 | 49·25 | 45·50 | 45·00 | 45·50 | 48·58 | 32·00 | NW, N, calm, W by N | 0 to 2 | b c. b. o b. |
| 2 | ·000 | ·070 | ·061 | − 3·0 | −15·0 | −10·833 | 29·5 | 0·0 | −14·5 | −10·54 | 50·40 | 47·66 | 46·00 | 46·33 | 49·66 | 33·00 | Calm, WNW | 0 to 1 | b. b c. |
| 3 | 29·900 | 29·910 | 29·918 | 5·0 | − 7·0 | − 1·416 | 29·5 | 6·0 | − 8·5 | − 0·66 | 50·50 | 46·90 | 48·00 | 48·66 | 50·83 | 33·00 | Calm, S, SSE | 0 *to* 3 | b c. o m. o ms. |
| 4 | 30·100 | ·970 | ·997 | 7·0 | − 2·0 | 2·791 | 29·5 | 10·5 | − 2·0 | 2·31 | 50·23 | 47·13 | 46·33 | 48·00 | 52·33 | 33·00 | S, SSE, calm | 0 to 2 | o ms. o m. b c. o c m. |
| 5 | ·180 | 30·162 | 30·162 | 8·0 | −11·0 | − 5·666 | 29·5 | 13·0 | −14·0 | − 3·73 | 48·53 | 45·80 | 45·83 | 46·00 | 52·16 | 33·00 | Calm | 0 | o c m. b c m. |
| 6 | ·160 | ·156 | ·139 | 1·0 | − 9·0 | − 5·666 | 29·5 | 0·0 | −11·0 | 5·38 | 48·33 | 45·43 | 44·33 | 45·00 | 49·33 | 33·00 | Calm, N, NE, ENE | 0 to 3 | b c m. b c. o. b c q. |
| 7 | 29·880 | ·000 | 29·976 | −13·0 | −24·0 | −12·208 | 29·5 | − 4·0 | −24·0 | −16·35 | 47·73 | 44·33 | 41·83 | 41·33 | 49·83 | 33·00 | NE, calm, N, NW, NNW | 0 to 3 | b q. b c. b. |
| 8 | ·800 | 29·800 | ·807 | −14·5 | −24·5 | −18·666 | 29·5 | − 8·0 | −23·0 | −17·33 | 45·10 | 42·00 | 43·50 | 41·16 | 48·66 | 33·00 | NE, NW, NNW, N, calm | 0 to 2 | b. o b c. b c. |
| 9 | ·916 | ·880 | ·846 | − 4·0 | −20·0 | −11·916 | 29·5 | − 2·0 | −21·0 | −11·44 | ... | ... | 44·91 | 43·16 | 49·08 | 33·00 | Calm, NW, ENE | 0 to 6 | b c. b. |
| 10 | ·920 | ·900 | ·920 | 9·0 | − 1·0 | 3·416 | 29·5 | 10·5 | − 5·0 | 1·48 | ... | ... | 43·00 | 42·33 | 46·83 | 32·00 | ENE, NE, N by E | 3 to 6 | b c. b c q. o b c m. |
| 11 | ·880 | ·936 | ·908 | 10·0 | − 2·0 | 1·625 | 29·5 | 11·0 | − 3·0 | 0·85 | ... | ... | 44·33 | 41·58 | 47·66 | 32·00 | N by E, calm, NW, NNW | 0 to 4 | b c m. b c. o. o c q. |
| 12 | ·916 | ·900 | ·910 | 3·5 | − 6·0 | − 3·083 | 29·5 | 9·0 | − 6·0 | − 1·60 | ... | ... | 40·50 | 40·41 | 51·83 | 32·00 | WNW, W, calm, NW, NNW | 0 to 2 | o c s. o m s. o s. o m. |
| 13 | ·900 | ·952 | ·930 | 2·0 | −14·0 | − 5·250 | 29·5 | 7·0 | −13·0 | − 3·69 | ... | ... | 41·08 | 42·16 | 49·58 | 31·50 | Calm, NNE, NNW | 0 to 4 | o m. o m c. b c. |
| 14 | ·940 | ·970 | ·949 | − 3·5 | −25·5 | −18·375 | 29·5 | − 2·0 | −25·0 | −15·12 | ... | ... | 35·41 | 36·91 | 47·66 | 31·00 | Calm, NW, WSW, S | 0 to 5 | b c. b c q. b c m. |
| 15 | ·670 | ·536 | ·630 | − 9·0 | −19·5 | −13·416 | 29·5 | − 9·0 | −15·5 | −11·54 | ... | ... | 33·58 | 35·08 | 46·00 | 30·00 | S, SE, NE, NE by E | 1 to 7 | b c m. o m. o m s. |
| 16 | ·894 | ·850 | ·845 | −11·5 | −25·0 | −20·875 | 29·5 | −10·0 | −24·5 | −19·10 | ... | ... | 30·08 | 33·41 | 45·50 | 30·50 | NE by E, NE, NNW, calm | 0 to 6 | o m. b c q. b m. |
| 17 | ·886 | ·872 | ·869 | − 6·5 | −14·5 | −11·208 | 29·5 | 0·0 | −13·0 | − 8·12 | ... | ... | 31·16 | 35·91 | 46·66 | 30·00 | Calm, N, NNW | 0 to 6 | b c m. b m. b c. |
| 18 | ·912 | ·918 | ·916 | −11·5 | −20·0 | −15·583 | 29·5 | − 7·0 | −17·5 | −13·50 | ... | ... | 30·91 | 33·41 | 43·83 | 29·50 | NNW, N, NW | 1 to 4 | o m q. o m q. b c. |
| 19 | ·916 | ·938 | ·919 | −11·5 | −17·5 | −14·791 | 29·5 | −11·0 | −16·0 | −13·90 | ... | ... | 31·33 | 32·66 | 43·50 | 30·00 | NW, calm, N, NE, NNE | 0 to 5 | b c m. b c. b c q m. |
| 20 | ·970 | ·918 | ·926 | −10·5 | −24·5 | −17·791 | 29·5 | − 9·0 | −23·0 | −16·40 | ... | ... | 34·83 | 37·16 | 43·83 | 30·50 | NNE, NNW, calm, NW | 0 to 4 | b c m q. b m. b. |
| 21 | 30·040 | 30·013 | 30·023 | −11·0 | −20·0 | −15·666 | 29·5 | −10·0 | −18·5 | −15·08 | ... | ... | 37·90 | 40·40 | 48·40 | 31·00 | NW, NNE, calm | 0 to 2 | b. b c. |
| 22 | ·158 | ·094 | ·103 | − 2·5 | −12·0 | − 7·041 | 29·5 | 0·0 | − 9·5 | − 5·94 | ... | ... | 37·33 | 36·83 | 45·83 | 32·00 | Calm, N, NW | 0 to 2 | b c. o m c. o m. b c m. |
| 23 | ·266 | ·250 | ·242 | − 3·0 | −12·0 | − 7·750 | 29·5 | 2·0 | −11·5 | − 5·14 | ... | ... | 41·83 | 40·00 | 47·08 | 31·50 | N, NW, NNW | 2 to 4 | b c m. b c. c. |
| 24 | ·290 | ·290 | ·284 | − 6·0 | −14·0 | −10·583 | 29·5 | −0·5 | −13·0 | − 8·54 | ... | ... | 42·66 | 42·25 | 47·83 | 33·00 | NNW, N, NE, calm, NW | 0 to 4 | b c m. b c q. b c. |
| 25 | ·380 | ·312 | ·325 | − 3·5 | −14·0 | − 8·458 | 29·5 | 2·0 | −15·5 | − 7·10 | ... | ... | 42·58 | 43·70 | 49·33 | 29·50 | NW, calm | 0 to 3 | b c q. b c. b c m. b. |
| 26 | ·516 | ·454 | ·456 | − 4·0 | −18·0 | − 8·875 | 29·5 | 7·0 | −17·0 | − 6·75 | ... | ... | 41·16 | 43·08 | 50·16 | 29·00 | Calm, NW, NE | 0 to 3 | b c. b c m. b c o. |
| 27 | ·552 | ·552 | ·545 | 3·0 | − 4·0 | − 1·166 | 29·5 | 5·0 | − 4·5 | − 0·18 | ... | ... | 43·16 | 43·91 | 50·08 | 31·00 | NW, N by E, N | 1 to 4 | b m q. b c. b. b c m. |
| 28 | ·522 | ·512 | ·530 | 7·0 | − 4·0 | 0·791 | 29·5 | 10·0 | − 4·0 | 1·50 | ... | ... | 42·25 | 44·50 | 52·33 | 31·00 | NW, N, NNE | 1 to 8 | b c q. b q m. b m. |
| 29 | ·484 | ·500 | ·495 | 7·0 | − 5·0 | 1·416 | 29·5 | 17·5 | − 6·0 | 3·50 | ... | ... | 50·50 | 43·08 | 42·75 | 30·00 | NW, N, N by W, N by E | 0 to 1 | b m. b c. b o. |
| 30 | ·492 | ·508 | ·498 | 13·0 | − 4·0 | 3·666 | 29·5 | 23·0 | 2·0 | 12·77 | ... | ... | 43·30 | 44·90 | 51·50 | 31·00 | Calm | 0 | b c. b. |
| Max. | 30·552 | 30·552 | 30·545 | 13·0 | ... | ... | 29·5 | 23·0 | ... | ... | ... | ... | 50·50 | 48·66 | 52·33 | 33·00 | ... ... ... ... | 8 | |
| Min. | 29·670 | 29·536 | 29·630 | ... | −25·5 | ... | 29·5 | ... | −27·0 | ... | ... | ... | 30·08 | 32·66 | 43·50 | 29·00 | | | |
| Mean | 30·083 | 30·075 | 30·075 | ... | ... | − 8·661 | 29·5 | ... | ... | −8·60 | ... | ... | 40·82 | 41·39 | 48·28 | 31·47 | ... ... ... ... | 3·83 | |

# MAY, 1853.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | | |
| May 1 | 30·450 | 30·440 | 30·513 | 16·0 | 3·00 | 10·833 | 29·500 | 23·0 | 2·0 | 12·77 | ... | ... | 45·83 | 44·16 | 53·91 | 31·00 | Calm, NW | 0 to 1 | bc.oms.b. |
| 2 | ·480 | ·440 | ·473 | 16·0 | 3·00 | 8·458 | 29·500 | 14·0 | 1·0 | 7·02 | ... | ... | 41·41 | 43·16 | 51·33 | 31·50 | Calm, SSW, SW | 0 to 3 | b.bcms.oc.om. |
| 3 | ·538 | ·500 | ·526 | 11·0 | −1·00 | 2·916 | 29·500 | 15·5 | −1·5 | 4·04 | ... | ... | 38·41 | 41·25 | 51·66 | 32·00 | Calm, NW, NE, NNE | 0 to 1 | o.os.om. |
| 4 | ·438 | ·415 | ·469 | 4·0 | −2·50 | 1·625 | 29·500 | 7·0 | −9·0 | −1·58 | ... | ... | 38·91 | 42·50 | 51·33 | 32·50 | Calm, NW, NE, N | 0 to 2 | om.o.oms.ofs. |
| 5 | ·438 | ·415 | ·465 | 8·0 | −2·50 | 3·208 | 29·500 | 8·0 | −9·0 | −0·48 | ... | ... | 41·91 | 42·41 | 51·91 | 33·00 | N, NNW, NW by N, calm | 0 to 2 | of.oms.om.bc. |
| 6 | ·284 | ·380 | ·384 | 18·0 | 2·00 | 1·391 | 29·500 | 10·0 | Zero | 5·59 | ... | ... | 41·75 | 42·58 | 48·91 | 32·50 | Calm, NW | 0 to 2 | bc.b. |
| 7 | ·284 | ·380 | ·380 | 10·0 | −5·00 | 2·375 | 29·500 | 10·0 | Zero | 5·25 | ... | ... | 39·83 | 40·41 | 48·00 | 33·00 | NW, calm | 0 to 2 | bc. |
| 8 | 29·930 | ·130 | ·113 | 15·0 | Zero | 6·541 | 29·500 | 12·0 | −1·6 | 3·90 | ... | ... | 40·90 | 42·30 | 49·00 | 32·50 | Calm, W, SW | 0 to 4 | bc.os.om.oms. |
| 9 | ·738 | 29·790 | 29·797 | 11·0 | 4·00 | 8·708 | 29·800 | 10·5 | 2·0 | 7·75 | ... | ... | 42·00 | 43·41 | 50·50 | 32·50 | W, N, calm, NW | 0 to 4 | oms.bcms.obc. |
| 10 | ·754 | ·720 | ·742 | 12·0 | 1·00 | 6·000 | 29·500 | 12·0 | −2·5 | 6·20 | ... | ... | 43·83 | 44·66 | 47·33 | 33·00 | NW, calm | 0 to 2 | bcs.bcm.bc. |
| 11 | ·832 | ·810 | ·804 | 15·0 | 3·00 | 7·500 | 29·500 | 12·5 | Zero | 5·94 | ... | ... | 43·83 | 44·08 | 48·00 | 33·00 | NW, W, S, calm | 0 to 2 | bcm.bc.om. |
| 12 | ·970 | ·990 | ·931 | 21·0 | 5·00 | 10·666 | 29·500 | 17·5 | 1·0 | 8·35 | ... | ... | 44·41 | 45·33 | 48·75 | 33·00 | Calm, N, NE | 0 to 3 | bc.bcm. |
| 13 | 30·250 | 30·075 | 30·076 | 26·5 | 2·00 | 10·250 | 29·500 | 16·0 | −1·5 | 6·42 | ... | ... | 43·83 | 46·50 | 51·16 | 33·00 | Calm, NW, NE | 0 to 2 | bcm.bc.bcv. |
| 14 | ·270 | ·345 | ·314 | 18·0 | −0·50 | 7·750 | 29·500 | 15·0 | −2·0 | 6·12 | ... | ... | 44·83 | 45·41 | 54·16 | 33·50 | NW, N, NE, NNE, calm | 0 to 3 | b.bc.bcs. |
| 15 | ·052 | ·140 | ·153 | 27·0 | 5·00 | 13·791 | 29·500 | 22·0 | 1·0 | 9·33 | ... | ... | 46·50 | 45·25 | 51·33 | 34·00 | NW, calm, S, SSE | 0 to 4 | bc.bcm.oc. |
| 16 | 29·950 | ·150 | ·024 | 24·0 | 16·00 | 20·458 | 29·500 | 21·0 | 12·0 | 17·38 | ... | ... | 45·90 | 49·25 | 53·66 | 33·50 | S, calm | 0 to 2 | oc.oms.om. |
| 17 | ·826 | 29·800 | 29·855 | 30·0 | 16·00 | 20·333 | 29·500 | 25·0 | 14·0 | 17·23 | ... | ... | 47·50 | 51·25 | 55·60 | 33·00 | S, N, calm | 0 to 4 | om.bcqr.bc.oc. |
| 18 | ·788 | ·900 | ·852 | 30·0 | 19·00 | 24·583 | 29·500 | 28·5 | 17·0 | 21·62 | ... | ... | 50·00 | 51·08 | 53·00 | 33·50 | Calm, S, SE, SSE | 0 to 3 | oc.om.o.omg. |
| 19 | ·684 | ·715 | ·723 | 34·0 | 18·00 | 25·500 | 29·500 | 30·0 | 16·0 | 23·29 | ... | ... | 49·58 | 51·16 | 57·33 | 35·00 | SSE, SE by E, S, calm | 0 to 1 | bc.oc.om.bcv. |
| 20 | ·710 | ·740 | ·742 | 46·0 | 20·00 | 29·666 | 29·500 | 39·0 | 19·0 | 26·76 | ... | ... | 55·58 | 52·00 | 58·83 | 34·00 | NE, calm, E | 0 to 2 | bc.b.r. |
| 21 | ·574 | ·665 | ·642 | 32·0 | 22·00 | 26·833 | 29·500 | 38·0 | 19·0 | 25·63 | ... | ... | 56·25 | 51·08 | 54·66 | 34·50 | Calm, NNW, W, SW by W | 0 to 3 | r.bc.oms.om. |
| 22 | ·540 | ·550 | ·564 | 34·0 | 23·00 | 27·208 | 29·500 | 30·0 | 19·5 | 22·87 | ... | ... | 54·50 | 49·58 | 52·91 | 34·50 | W, NW, SW, calm | 0 to 3 | om.oms. |
| 23 | ·683 | ·590 | ·601 | 33·0 | 20·00 | 23·416 | 29·500 | 33·0 | 17·0 | 22·48 | ... | ... | 54·25 | 51·75 | 52·66 | 34·50 | Calm, NNE, NNW, NW | 0 to 3 | oms.bc.o.om. |
| 24 | ·816 | ·770 | ·752 | 32·0 | 23·00 | 27·083 | 29·500 | 29·0 | 20·0 | 24·12 | ... | ... | 56·00 | 50·00 | 54·58 | 35·00 | N, NNE, NE, ENE | 1 to 4 | om.oms.bc.os. |
| 25 | ·958 | ·940 | ·938 | 28·5 | 16·50 | 21·208 | 29·500 | 58·0 | 28·0 | 39·48 | ... | ... | 52·60 | 51·70 | 56·80 | 36·00 | NE, NNW, calm, NE | 0 to 5 | cq.omq.o.om. |
| 26 | ·814 | ·975 | ·949 | 21·0 | 11·00 | 16·625 | 29·500 | 25·5 | 13·0 | 17·12 | ... | ... | 51·75 | 48·41 | 58·83 | 36·00 | NNW, NW, N | 2 to 7 | bcqm.bcf.cqms. |
| 27 | ·672 | ·730 | ·767 | 22·0 | 15·00 | 19·083 | 29·500 | 22·0 | 14·0 | 19·00 | ... | ... | 54·60 | 50·20 | 57·20 | 36·50 | N, NW, NE | 1 to 7 | bcqm.ocqm. |
| 28 | ·738 | ·770 | ·653 | 24·0 | 18·00 | 21·500 | 29·500 | 30·5 | 17·5 | 21·87 | ... | ... | 57·40 | 49·10 | 55·20 | 34·50 | NE, calm | 0 to 3 | bc.bcq. |
| 29 | ·554 | ·670 | ·653 | 27·0 | 18·00 | 22·291 | 29·500 | 29·5 | 17·5 | 23·56 | ... | ... | 50·75 | 47·41 | 49·66 | 33·00 | NW, NNW, N | 1 to 6 | oc.o.oqm.bcm. |
| 30 | ·442 | ·480 | ·486 | 33·0 | 18·00 | 24·000 | 29·500 | 32·0 | 18·0 | 23·15 | ... | ... | 54·90 | 48·90 | 52·00 | 34·00 | N, NW, NE, W | 1 to 2 | bc.o.om.bcf. |
| 31 | ·462 | ·530 | ·511 | 34·5 | 25·00 | 28·958 | 29·500 | 36·0 | 23·0 | 26·66 | ... | ... | 58·50 | 47·80 | 54·20 | 35·00 | W, SE, calm, NE | 0 to 3 | bcf.bc.o.c. |
| Max. | 30·538 | 30·500 | ... | 46·0 | ... | ... | ... | 58·0 | ... | ... | ... | ... | 58·50 | 51·75 | 58·83 | 35·00 | | | |
| Min. | 29·442 | 29·480 | ... | ... | −5·00 | ... | ... | ... | −9·0 | ... | ... | ... | 38·41 | 40·41 | 47·33 | 31·00 | | | |
| Mean | 29·997 | 29·997 | 29·996 | ... | ... | 15·508 | 29·500 | ... | ... | 14·73 | ... | ... | 48·00 | 46·89 | 52·72 | 33·33 | | | |

# JUNE, 1853.

*Winter Quarters, Northumberland Sound, 76° 52′ N., 97° W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | Direction. | Force. | |
| June 1 | 29·610 | 29·520 | 29·524 | 33·000 | 26·00 | 28·583 | 29·500 | 34·0 | 24·5 | 27·63 | ... | ... | 58·10 | 43·30 | 54·90 | 36·00 | Calm, NNW, NW, N | 0 to 3 | bc.oc.o. |
| 2 | ·690 | ·720 | ·708 | 30·000 | 25·00 | 27·125 | 29·000 | 33·0 | 23·0 | 25·58 | ... | ... | 58·30 | 46·80 | 58·50 | 36·00 | NNW, W, calm, SW, S | 0 to 5 | oc.ocm.om.oms. |
| 3 | ·780 | ·750 | ·738 | 31·500 | 24·00 | 27·000 | 29·500 | 28·0 | 22·0 | 25·08 | ... | ... | 52·80 | 46·60 | 55·70 | 36·50 | S, S by E, SSW, SSE | 2 to 5 | cm.oms.om.bcm. |
| 4 | ·950 | ·880 | ·895 | 35·000 | 23·00 | 27·916 | 29·500 | 31·0 | 22·0 | 25·87 | ... | ... | 57·70 | 46·30 | 53·70 | 36·50 | SSE, SE, ENE, NE by E | 1 to 2 | bc.bcms. |
| 5 | ·628 | ·930 | ·849 | 31·000 | 25·00 | 27·958 | 29·500 | 32·5 | 22·5 | 25·58 | ... | ... | 51·40 | 46·40 | 54·80 | 37·00 | NE, NNW, SW | 1 to 4 | bc.oc.bcms. |
| 6 | ·570 | ·575 | ·603 | 36·500 | 24·00 | 29·000 | 29·500 | 39·0 | 23·0 | 28·33 | ... | ... | 46·00 | 46·50 | 55·10 | 36·50 | SW, WSW, NW, W, calm | 0 to 4 | omsf.oc.cm.oms. |
| 7 | ·652 | ·680 | ·664 | 32·000 | 21·00 | 26·500 | 30·000 | 35·0 | 20·0 | 25·00 | ... | ... | 52·50 | 46·30 | 55·30 | 37·00 | NE, W, NNE, N, NNW | 1 to 3 | bc.oms. |
| 8 | ·568 | ·655 | ·630 | 33·500 | 28·00 | 30·125 | 30·000 | 31·0 | 25·0 | 27·67 | ... | ... | 49·25 | 46·00 | 55·25 | 37·00 | NNW, NE, calm | 0 to 5 | bc.omd.bcq. |
| 9 | ·580 | ·540 | ·555 | 34·000 | 28·50 | 30·916 | 30·000 | 31·0 | 25·0 | 27·92 | ... | ... | 49·25 | 44·60 | 54·50 | 37·00 | NNW, WNW, calm, S, SW | 0 to 5 | bcq.oc.bc.oms. |
| 10 | ·720 | ·755 | ·663 | 35·000 | 29·00 | 31·250 | 30·000 | 36·0 | 26·0 | 29·71 | ... | ... | 53·50 | 45·50 | 54·00 | 36·50 | SW, S, ESE, NE | 1 to 2 | oc.bc.o. |
| 11 | ·592 | ·675 | ·652 | 37·000 | 26·00 | 30·375 | 30·000 | 38·0 | 25·0 | 29·96 | ... | ... | 46·75 | 47·25 | 54·87 | 37·00 | NE, calm, N, NE by N | 0 to 2 | oc.bc.bcq. |
| 12 | ·652 | ·610 | ·631 | 37·000 | 25·00 | 29·500 | 30·000 | 36·0 | 23·5 | 28·71 | ... | ... | 50·25 | 46·00 | 49·50 | 37·00 | NE, NNE, calm, NNW | 0 to 5 | bc.bcq. |
| 13 | ·628 | ·680 | ·661 | 36·000 | 29·00 | 32·250 | 31·000 | 33·0 | 24·5 | 28·21 | ... | ... | 47·75 | 41·37 | 45·20 | 36·50 | NNW, NW, SW, calm, W | 0 to 2 | bc.bcm.of.om. |
| 14 | ·574 | ·620 | ·614 | 36·500 | 32·00 | 34·291 | 31·500 | 39·0 | 31·0 | 32·55 | ... | ... | 47·33 | 43·33 | 50·41 | 36·50 | NE, WNW, NW, NNW | 1 to 4 | om.oms.bc.bcm. |
| 15 | ·460 | ·510 | ·508 | 35·000 | 30·50 | 32·500 | 32·000 | 42·0 | 35·0 | 29·55 | ... | ... | 51·60 | 46·60 | 50·10 | 36·00 | NW, SW by W, W, NNW | 1 to 4 | oc.bcm.oms.om. |
| 16 | ·536 | ·545 | ·543 | 35·000 | 29·50 | 31·500 | 32·500 | 33·0 | 27·0 | 29·35 | ... | ... | 50·25 | 46·50 | 54·75 | 36·50 | NNW, N, NW | 1 to 7 | oqms.ocq.bc. |
| 17 | ·500 | ·590 | ·558 | 35·000 | 27·00 | 32·208 | 33·000 | 36·0 | 25·0 | 30·04 | ... | ... | 55·87 | 47·75 | 55·87 | 37·00 | NW, NNW, calm | 0 to 4 | oqms.oc.bc.of. |
| 18 | ·518 | ·470 | ·494 | 36·500 | 30·00 | 32·791 | 34·000 | 38·0 | 27·5 | 31·58 | ... | ... | 52·87 | 48·75 | 53·25 | 40·00 | Calm, NE | 0 to 3 | f.bc.ocq.c. |
| 19 | ·640 | ·620 | ·606 | 40·000 | 30·00 | 33·208 | 32·000 | 42·0 | 27·0 | 31·62 | ... | ... | 52·25 | 48·50 | 53·00 | 38·50 | NE, NNW, W, NW | 1 to 3 | bc.ocq.ocm.om. |
| 20 | ·886 | ·760 | ·770 | 35·000 | 31·00 | 32·708 | 34·000 | 32·0 | 26·0 | 28·27 | ... | ... | 56·62 | 48·50 | 49·87 | 38·50 | NW, W, SSE, S | 1 to 5 | om.o.ocq.oc. |
| 21 | ·892 | ·900 | ·918 | 33·000 | 30·00 | 31·125 | 34·000 | 30·0 | 27·0 | 27·98 | ... | ... | 55·50 | 47·37 | 50·25 | 38·00 | South | 2 to 6 | omsq.ocq. |
| 22 | ·918 | ·950 | ·937 | 35·000 | 32·00 | 32·875 | 34·000 | 34·0 | 29·5 | 30·46 | ... | ... | 51·50 | 49·80 | 51·00 | 39·00 | South | 3 to 7 | ocq.oc.ocqs. |
| 23 | ·800 | ·870 | ·856 | 36·500 | 32·50 | 34·222 | 33·000 | 34·0 | 30·0 | 31·06 | ... | ... | 51·25 | 48·75 | 53·00 | 37·50 | South | 1 to 5 | cqs.oc.ocs.oc. |
| 24 | 30·090 | ·985 | ·970 | 42·000 | 34·00 | 38·916 | 33·250 | 40·0 | 30·0 | 34·21 | ... | ... | 50·62 | 49·62 | 51·50 | 39·50 | S, calm, NE | 0 to 3 | od.om.bc.bcq. |
| 25 | ·190 | 30·180 | 30·156 | 43·000 | 33·50 | 38·083 | 32·666 | 41·0 | 30·5 | 34·08 | ... | ... | 48·87 | 49·87 | 53·75 | 39·50 | Calm, NNE, NE | 0 to 3 | bc.bcq.bcm. |
| 26 | ·130 | ·180 | ·181 | 46·500 | 35·00 | 40·083 | 33·000 | 38·0 | 31·5 | 34·83 | ... | ... | 52·12 | 51·87 | 52·62 | 41·50 | NNE, NE, calm | 0 to 4 | bcm.bc.bcq.bv. |
| 27 | ·030 | ·075 | ·080 | 41·000 | 32·00 | 38·458 | 33·400 | 37·5 | 31·0 | 35·00 | ... | ... | 53·12 | 50·62 | 53·16 | 40·00 | Calm, NE, NW, NNE | 0 to 3 | bv.bcm.bc.v. |
| 28 | 29·780 | 29·970 | 29·923 | 42·000 | 35·00 | 37·125 | 33·250 | 37·0 | 30·0 | 32·48 | ... | ... | 51·25 | 50·50 | 52·00 | 38·50 | NNW, NW, calm, WSW | 0 to 2 | bc.bcf.oc.cof. |
| 29 | ·624 | ·710 | ·697 | 39·000 | 33·00 | 35·375 | 33·000 | 34·0 | 29·5 | 31·64 | ... | ... | 50·87 | 50·75 | 53·50 | 39·00 | Calm, NE, E by S, NNE | 0 to 6 | of.oc.com.ocg. |
| 30 | ·664 | ·620 | ·642 | 38·500 | 34·00 | 35·666 | 33·666 | 42·0 | 30·0 | 35·42 | .. | .. | 51·87 | 51·25 | 54·00 | 40·50 | NNE, NW, W, calm | 0 to 3 | com.bc.of.b.bcf. |
| Max. | 30·190 | 30·180 | ... | 46·500 | .... | ... | ... | 42·0 | ... | ... | . | .. | 58·30 | 51·87 | 58·50 | 41·50 | | | |
| Min. | 29·460 | 29·610 | ... | ... | 21·00 | ... | ... | ... | 20·0 | ... | ... | .. | 46·00 | 41·37 | 45·20 | 36·00 | | | |
| Mean | 29·728 | 29·750 | 29·740 | ... | ... | 32·321 | 31·650 | ... | ... | 29·84 | ... | .. | 51·91 | 47·44 | 53·14 | 38·08 | | | |

# JULY, 1853.

*Winter Quarters, Northumberland Sound, until the 14th.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | Spirit Room. | Direction. | Force. | |
| July 1 | 29·684 | 29·664 | 29·686 | 39·0 | 32·0 | 35·833 | 33·500 | 43·00 | 32·00 | 35·79 | 35·79 | ... | 50·62 | 51·75 | ... | 40·50 | W, calm, SW, SSW, WNW | 0 to 4 | bcf.bc.com. |
| 2 | ·900 | ·820 | ·835 | 42.0 | 32·0 | 36·166 | 33·250 | 41·00 | 32·00 | 35·92 | 35·92 | ... | 50·60 | 51·40 | ... | 41·00 | NW by W, WNW, NW | 0 to 4 | bcm.bcf.bc.cm. |
| 3 | ·950 | ·924 | ·934 | 39·5 | 34·0 | 35·208 | 32·625 | 39·00 | 33·00 | 34·42 | 34·42 | ... | 53·37 | 50·62 | ... | 40·00 | Calm, S, S by W, SSE | 0 to 8 | c.ocq.com q. of. |
| 4 | ·820 | ·970 | ·922 | 43·0 | 35·5 | 38·000 | 32·900 | 38·00 | 34·00 | 36·08 | 36·08 | ... | 50·62 | 51·25 | ... | 40·00 | SSE, SE | 2 to 8 | o m q. b m q. b c q. |
| 5 | ·780 | ·770 | ·772 | 42·5 | 37·0 | 38·750 | 32·833 | ... | ... | ... | 38·75 | ... | 51·50 | 50·82 | ... | 40·50 | SSE, SE, SSW | 1 to 7 | o c m. b c m q. o q. |
| 6 | ·830 | ·830 | ·819 | 37·0 | 33·0 | 34·958 | 33·000 | ... | ... | ... | 35·00 | 35·00 | 51·90 | 51·80 | ... | 41·00 | SSW, SW, WSW | 1 | o m. o m s. o c f. |
| 7 | ·850 | ·858 | ·856 | 40·0 | 34·0 | 37·708 | 32·750 | ... | ... | ... | 38·00 | 36·83 | 52·75 | 54·00 | ... | 41·50 | SW, calm | 0 to 1 | c o m d. o c. b c. |
| 8 | ·664 | ·750 | ·736 | 41·0 | 36·5 | 38·083 | 33·625 | ... | ... | ... | 37·91 | 37·00 | 52·00 | 53·00 | ... | 41·00 | Calm, SSE, SE by E, SE, S | 0 to 2 | o c. o. o m d. c o m. |
| 9 | ·510 | ·630 | ·598 | 40·5 | 36·0 | 39·000 | 33·250 | ... | ... | ... | 37·66 | 37·00 | 57·00 | 53·50 | ... | 43·50 | S by E, S, calm, E | 0 to 3 | c o m. o c. o f. o c d. |
| 10 | ·540 | ·456 | ·476 | 46·0 | 39·0 | 40·291 | 33·200 | ... | ... | ... | 42·70 | 39·12 | 53·12 | 53·00 | ... | 43·50 | E, NE, NE by E, S | 1 to 4 | b c. o q m. e q. m g o. |
| 11 | ·710 | ·670 | ·671 | 44·0 | 33·5 | 35·126 | 33·166 | ... | ... | ... | 38·92 | 38·14 | 52·25 | 51·25 | ... | 44·00 | S, SW, calm, SW by W, W | 0 to 2 | b c. o f. o c. |
| 12 | ·800 | ·760 | ·761 | 43·5 | 32·0 | 35·833 | 32·250 | ... | ... | ... | 41·55 | 40·40 | 52·25 | 50·50 | ... | 46·00 | W, WSW | 1 to 2 | b c. o m g. c m q. |
| 13 | ·862 | ·850 | ·840 | 60·0 | 36·0 | 45·277 | 33·000 | ... | ... | ... | 45·75 | 44·33 | 52·62 | 52·62 | ... | 45·50 | W, calm, N | 0 to 2 | b c. b. |
| 14 | ·820 | ·852 | ·843 | 47·0 | 36·0 | 43·062 | 32·500 | Ship moving easterly. | | | 44·50 | 44·00 | 56·00 | 53·87 | ... | 45·00 | N, calm, NW, WNW | 0 to 3 | b. b c. |
| 15 | ·470 | ·720 | ·663 | 47·0 | 37·0 | 38·714 | 32·250 | | | | 41·50 | 39·00 | 55·37 | 52·62 | ... | 46·00 | Calm, SSE, SW | 0 to 4 | b c. c m r. |
| 16 | ·524 | ·383 | ·438 | 39·5 | 35·0 | 36·437 | 31·625 | ... | ... | ... | 37·00 | 37·00 | 58·75 | 52·37 | ... | 46·00 | SW, SSW, S | 2 to 4 | c m r. o r. o c r. o c d |
| 17 | ·800 | ·714 | ·746 | 43·0 | 34·0 | 37·611 | 30·500 | ... | ... | ... | 37·75 | 36·50 | 59·87 | 52·87 | ... | 46·00 | SSW, calm, NW by W | 0 to 4 | b c m. b f. c q. c f d. |
| 18 | ·572 | ·661 | ·663 | 41·5 | 35·0 | 37·916 | 30·600 | ... | ... | ... | 37·75 | 36·75 | 55·12 | 51·12 | ... | 46·00 | NW by W, NW, WNW | 0 to 6 | c f d. c o. b c m. m q. |
| 19 | ·314 | ·500 | ·476 | 42·5 | 37·0 | 40·000 | 30·375 | ... | ... | ... | 41·00 | 40·50 | 47·87 | 48·75 | ... | 46·00 | WNW, SSE, SE | 4 to 6 | m q. c q. o q r. c m r. |
| 20 | ·600 | ·580 | ·588 | 43·0 | 33·0 | 37·000 | 30·833 | ... | ... | ... | 39·00 | 38·00 | 49·87 | 47·00 | ... | 45·50 | SE, calm, S, N by W | 0 to 4 | o c. b c. |
| 21 | ·650 | ·610 | ·619 | 37·0 | 26·5 | 30·944 | 30·750 | ... | ... | ... | 34·00 | 33·00 | 52·75 | 47·75 | ... | 45·50 | N by W, NW, WNW | 3 to 6 | b c. c o q. c o m. |
| 22 | ·688 | ·674 | ·675 | 35·5 | 29·5 | 32·916 | 32·100 | ... | ... | ... | 33·50 | 32·00 | 49·25 | 51·00 | ... | 49·00 | NW, W, calm | 0 to 3 | c o m. o c. c o m f. |
| 23 | ·570 | ·650 | ·626 | 36·0 | 32·0 | 34·416 | 31·625 | ... | ... | ... | 35·66 | 34·75 | 54·75 | 48·75 | ... | 46·00 | Calm, W, ESE, E, SE | 0 to 5 | b c. c m. c o m r. |
| 24 | ·680 | ·600 | ·619 | 37·0 | 32·0 | 34·458 | 32·333 | ... | ... | ... | 36·33 | 36·00 | 55·50 | 53·62 | ... | 46·00 | ESE, calm, SE | 0 to 5 | c q m r. o m. c q d. |
| 25 | ·704 | ·702 | ·702 | 36·5 | 33·0 | 34·458 | 32·250 | ... | ... | ... | 36·00 | 34·50 | 55·50 | 53·12 | ... | 45·00 | Calm, N by W, SE, NNW | 0 to 2 | c m f. b c. o m. f m. |
| 26 | ·666 | ·700 | ·694 | 35·0 | 32·5 | 34·166 | 31·000 | In Wellington Channel. | | | 36·00 | 35·00 | 52·00 | 47·75 | ... | 46·00 | NNW, calm | 0 to 2 | o m. o c m. c f. |
| 27 | ·550 | ·612 | ·605 | 38·0 | 36·0 | 37·041 | 30·750 | | | | 37·00 | 37·00 | 54·25 | 49·00 | ... | 46·00 | Calm, SSE | 0 to 1 | c f. b c m. o m. b c. |
| 28 | ·450 | ·520 | ·509 | 38·0 | 34·0 | 35·100 | 30·400 | ... | ... | ... | 35·00 | 34·50 | 55·75 | 50·00 | ... | 46·00 | Calm, NW | 0 to 1 | o c. b c m. o s f. o f. |
| 29 | ·324 | ·270 | ·307 | 35·0 | 31·0 | 32·727 | 31·300 | ... | ... | ... | 33·00 | 32·50 | 50·12 | 49·62 | ... | 46·50 | NW, SE | 1 to 5 | c o m. o c q. b c q. b f. |
| 30 | ·646 | ·420 | ·500 | 35·0 | 31·5 | 33·600 | 31·750 | ... | ... | ... | 33·75 | 32·75 | 54 00 | 50·62 | ... | 46·00 | SE, ESE, E, SSW | 2 to 5 | o c m. b c m. b c q. |
| 31 | ·784 | ·790 | ·780 | 38·5 | 33·0 | 35·250 | 32·000 | ... | ... | ... | 35·66 | 35·50 | 53·37 | 49·25 | ... | 45·00 | SSW, W, SW | 1 to 2 | b c m. b c. o m. |
| Max. | 29·950 | 29·970 | ... | 60·0 | ... | ... | ... | ... | ... | ... | 45·75 | ... | 59·87 | 54·00 | ... | 49·00 | | | |
| Min. | 29·314 | 29·270 | ... | ... | 26·5 | ... | ... | ... | ... | ... | 33·00 | ... | 47·87 | 47·00 | ... | 40·00 | | | |
| Mean | 29·668 | 29·673 | 29·670 | ... | ... | 35·690 | 32·042 | ... | ... | ... | 36·51 | ... | 53·35 | 51·11 | ... | 44·73 | | | |

# AUGUST, 1853.

*In Wellington Channel and Port Refuge.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | Spirit Room. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | | |
| Aug. 1 | 29·688 | 29·721 | 29·724 | 35·5 | 33·5 | 34·666 | 31·583 | Wellington Channel. | | | 34·75 | 33·66 | 48·91 | 47·66 | ... | 46·00 | SW, WSW, Calm, SE . . | 0 to 2 | om. c. bc. o. |
| 2 | ·570 | ·648 | ·618 | 36·5 | 34·0 | 34·400 | 31·600 | ... | ... | ... | 34·00 | 33·50 | 48·66 | 49·50 | ... | 46·00 | Calm, SW, S, W . . . . | 0 to 3 | om. o. oc. bc. fo. |
| 3 | ·524 | ·550 | ·546 | 41·0 | 32·0 | 34·791 | 31·800 | ... | ... | ... | 34·25 | 33·66 | 45·58 | 47·75 | ... | 46·50 | W, calm, SSW, S . . . . | 0 to 3 | bc. bcm. o. |
| 4 | ·530 | ·448 | ·481 | 37·0 | 32·5 | 33·708 | 30·800 | ... | ... | ... | 33·00 | 33·00 | 50·25 | 50·00 | ... | 47·00 | S, SE, E, ENE, NNE . . | 1 to 2 | o. oc. cor. of s. |
| 5 | ·718 | ·630 | ·540 | 34·5 | 30·5 | 32·736 | 29·000 | ... | ... | ... | 32·00 | 32·00 | 51·83 | 51·46 | ... | 46·50 | NNE, WNW, NW by N . | 1 to 2 | o m s. bc. |
| 6 | ·800 | ·780 | ·776 | 37·0 | 31·5 | 33·791 | 29·500 | ... | ... | ... | 33·00 | 33·00 | 50·83 | 50·83 | ... | 47·00 | NNW, WNW, NW, W . . | 1 to 2 | bc. o. cq. o. cm. |
| 7 | ·680 | ·770 | ·759 | 35·0 | 31·5 | 33·083 | 29·000 | ... | ... | ... | 32·75 | 32·66 | 50·58 | 48·75 | ... | 43·50 | NNW, NW, NW by N . . | 1 to 4 | cm. c. o. o. bc. |
| 8 | ·582 | ·610 | ·620 | 34·0 | 32·0 | 32·916 | 29·000 | ... | ... | ... | 32·50 | 32·50 | 51·41 | 50·08 | ... | 43·50 | W by N, WNW, W . . . | 1 to 5 | bc. com. oc q. |
| 9 | ·630 | ·600 | ·595 | 35·0 | 33·0 | 33·958 | 29·166 | ... | ... | ... | 34·00 | 33·50 | 50·66 | 49·50 | ... | 46·50 | W, NW, calm, S . . . . | 0 to 1 | com. o s. o m s. |
| 10 | ·750 | ·652 | ·665 | 38·0 | 33·0 | 35·950 | 29·000 | ... | ... | ... | 35·00 | 34·00 | 49·83 | 48·91 | ... | 45·00 | SE, E, E by N, ESE, ENE | 0 to 3 | com. oc. o. bc. |
| 11 | ·844 | ·804 | ·805 | 42·0 | 35·0 | 36·166 | 29·000 | ... | ... | ... | 35·69 | 36·25 | 49·41 | 48·58 | ... | 45·50 | Calm, S, N, NE . . . . | 0 to 2 | bc. o. oh. oc. o. |
| 12 | ·850 | ·836 | ·843 | 41·0 | 30·5 | 34·772 | 30·333 | ... | ... | ... | 35·75 | 34·75 | 49·50 | 48·91 | ... | 44·00 | NE, SE, calm, NW, E, N . | 0 to 1 | c. bc. |
| 13 | ·790 | ·820 | ·820 | 41·5 | 31·0 | 34·916 | 30·400 | ... | ... | ... | 35·00 | 34·00 | 45·00 | 47·16 | ... | 43·50 | Calm, E, NE, W . . . . | 0 to 3 | b. bc. oc. s. com. |
| 14 | ·900 | ·810 | ·816 | 35·0 | 26·0 | 33·190 | 30·333 | ... | ... | ... | 33·00 | 32·00 | 50·00 | 49·16 | ... | 44·50 | West, SE . . . . . | 1 to 2 | o o m s. bc. |
| 15 | ·824 | ·940 | ·936 | 38·5 | 34·0 | 35·000 | 30·636 | ... | ... | ... | 35·50 | 34·75 | 50·00 | 49·25 | ... | 43·50 | ESE, SE, ENE, E, calm . | 0 to 4 | bc. c. oc mr. ocr. |
| 16 | ·753 | ·708 | ·730 | 35·0 | 32·5 | 34·666 | 30·363 | ... | ... | ... | 34·75 | 34·00 | 50·00 | 49·25 | ... | 44·00 | E, NE, ENE, SW . . . | 2 to 4 | oc. om. or. o. |
| 17 | ·318 | ·760 | ·569 | 35·0 | 32·5 | 33·850 | 29·833 | ... | ... | ... | 34·00 | 33·66 | 49·41 | 48·25 | ... | 42·00 | SW, NW, NE, ENE, E . | 2 to 9 | o. c. os. oqs. |
| 18 | ·436 | ·226 | ·292 | 35·0 | 32·5 | 33·318 | 30·333 | Port Refuge. | | | 33·00 | 32·50 | 49·41 | 49·00 | ... | 45·00 | E, SSE, S, SW, WSW . . | 3 to 7 | oq. ocs. om. of. |
| 19 | ·900 | ·754 | ·733 | 34·0 | 31·5 | 32·500 | 30·818 | ... | ... | ... | 32·66 | 32·30 | 50·00 | 48·41 | ... | 44·00 | WSW, SW, SSW . . . . | 2 to 6 | om. co. o fd. o m s. |
| 20 | ·914 | ·950 | ·925 | 34·5 | 32·5 | 33·363 | 31·000 | ... | ... | ... | 33·50 | 33·00 | 49·00 | 47·66 | ... | 43·00 | SW, SSW, SE, ESE, calm . | 0 to 2 | co. cd. cm. c. om. |
| 21 | ·856 | ·884 | ·878 | 36·5 | 31·5 | 33·727 | 30·458 | ... | ... | ... | 33·75 | 33·50 | 49·66 | 48·66 | ... | 43·50 | SSE, calm, N, NNE . . . | 0 to 5 | b c m s. o s. bc. bcq. |
| 22 | ·900 | ·896 | ·900 | 37·0 | 31·5 | 34·083 | 30·208 | ... | ... | ... | 34·66 | 34·50 | 49·58 | 48·66 | ... | 43·00 | NNE, N, W, NW . . . | 1 to 7 | bc. com. bcq. |
| 23 | ·820 | ·850 | ·851 | 37·5 | 32·0 | 33·750 | 30·666 | ... | ... | ... | 33·00 | 32·50 | 49·08 | 48·16 | ... | 43·50 | N, NW, calm . . . . . | 0 to 3 | b. bc. om. of. oc m. |
| 24 | ·800 | ·780 | ·786 | 36·5 | 33·0 | 34·916 | 31·208 | ... | ... | ... | 33·75 | 33·00 | 48·75 | 47·91 | ... | 43·00 | SW, calm, SSW, SW by S . | 0 to 3 | om. f. of. co. com. |
| 25 | ·590 | ·672 | ·662 | 36·0 | 34·0 | 35·136 | 31·136 | ... | ... | ... | 35·25 | 33·00 | 49·25 | 46·75 | ... | 44·00 | S, ESE, SE, SSE . . . . | 1 to 9 | com. o m c. o m. |
| 26 | ·550 | ·518 | ·524 | 37·0 | 33·0 | 34·875 | 31·291 | ... | ... | ... | 35·00 | 34·50 | 49·98 | 47·75 | ... | 45·00 | SSE, SE, ESE . . . . . | 4 to 7 | oq. bcq. cq. q. |
| 27 | ·630 | ·613 | ·601 | 38·0 | 35·5 | 37·090 | 31·400 | ... | ... | ... | 36·66 | 36·00 | 50·25 | 49·83 | ... | 44·50 | SE by E, NE, E by N . . | 1 to 4 | o. o m. o m f. o c d. |
| 28 | ·710 | ·690 | ·682 | 37·5 | 32·0 | 34·550 | 31·625 | ... | ... | ... | 35·00 | 34·75 | 53·00 | 51·33 | ... | 44·00 | NE, SE by E, E, SSE . . | 1 to 4 | com. c. cf. o f. f. |
| 29 | ·822 | ·712 | ·732 | 36·5 | 32·5 | 34·208 | 31·375 | ... | ... | ... | 34·66 | 34·00 | 52·50 | 50·33 | ... | 44·00 | SSE, S, calm, W, NW . . | 0 to 2 | oc m. o m. co. o s. |
| 30 | ·974 | ·918 | ·914 | 35·5 | 22·5 | 27·333 | 31·041 | ... | ... | ... | 35·30 | 33·00 | 49·33 | 47·83 | ... | 42·50 | NNW, NW . . . . . | 1 to 2 | b c m. o. b c. b c v. |
| 31 | ·900 | ·980 | ·954 | 29·0 | 23·0 | 26·350 | 29·619 | ... | ... | ... | 29·66 | 29·00 | 49·33 | 47·83 | ... | 42·50 | NNW, N, calm, NW, W . | 0 to 4 | bc. |
| Max. | 29·914 | 29·980 | ... | 42·0 | ... | ... | 31·800 | ... | ... | ... | 36·66 | ... | 52·50 | 51·46 | ... | 47·00 | | | |
| Min. | ·318 | ·226 | ... | ... | 22·5 | ... | 29·000 | ... | ... | ... | 29·66 | ... | 45·00 | 46·75 | ... | 42·00 | | | |
| Mean | ·724 | ·725 | 29·719 | ... | ... | 33·798 | 30·436 | ... | ... | ... | 34·05 | 33·43 | 49·67 | 48·87 | .... | 44·42 | | | |

# SEPTEMBER, 1853.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | Spirit Room. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | | |
| Sept. 1 | 29·750 | 29·814 | 29·817 | 33·0 | 28·0 | 29·375 | 29·090 | ... | ... | ... | 29·33 | 28·72 | 49·66 | 48·25 | ... | 42·50 | WSW, SW, WNW . . . | 1 to 4 | bc.o.c. |
| 2 | ·710 | ·700 | ·710 | 34·0 | 29·0 | 31·291 | 29·541 | ... | ... | ... | 32·00 | 30·50 | 48·91 | 47·91 | ... | 43·00 | W, SW, SW by W, N by W | 1 to 2 | c.co. |
| 3 | ·800 | ·760 | ·761 | 33·0 | 27·0 | 29·375 | 29·208 | ... | ... | ... | 29·00 | 28·50 | 48·83 | 48·75 | ... | 42·00 | N by N, NE by E, ENE, calm | 0 to 2 | oc.o. |
| 4 | ·860 | ·840 | ·839 | 34·0 | 25·0 | 29·791 | 29·277 | ... | ... | ... | 29·66 | 28·50 | 48·08 | 48·58 | ... | 41·50 | Calm, SE, S, SW . . . . | 0 to 1 | oc. bc. om. |
| 5 | ·950 | ·950 | ·946 | 31·0 | 26·0 | 28·416 | 29·208 | ... | ... | ... | 27·33 | 26·66 | 48·08 | 48·58 | ... | 41·50 | NW, NE, calm, SW, SSW | 0 to 3 | bc. oc. f. of. |
| 6 | ·720 | ·664 | ·743 | 30·0 | 20·5 | 26·458 | 29·208 | ... | ... | ... | 27·00 | 26·66 | 47·33 | 45·00 | ... | 44·00 | WSW, SW, SSW, W by S . | 1 to 5 | com. oc. o.s. bcqs. |
| 7 | ·494 | ·612 | ·602 | 19·5 | 17·0 | 17·909 | 29·125 | ... | ... | ... | 18·50 | 17·00 | 46·00 | 44·50 | ... | 43·00 | WNW, W, W by S, SW . | 3 to 6 | bcqs. com. cos. |
| 8 | ·530 | ·440 | ·475 | 18·5 | 9·0 | 15·181 | 29·166 | ... | ... | ... | 16·00 | 15·50 | 46·75 | 45·41 | ... | 42·50 | WSW, N, NNW, calm, SSE | 0 to 5 | oqs. ocqms. bc. |
| 9 | ·450 | ·554 | ·528 | 15·5 | 2·5 | 8·598 | 29·136 | ... | ... | ... | 8·50 | 7·00 | 46·16 | 46·00 | ... | 42·00 | NE, calm, ESE, SSE, SE by S | 0 to 3 | bc. bem. cm. |
| 10 | ·320 | ·330 | ·340 | 18·5 | 6·0 | 10·666 | 29·000 | ... | ... | ... | 10·50 | 9·50 | 44·58 | 41·41 | ... | 43·00 | SE, ESE, E, calm . . . . | 0 to 5 | com. cm. bc. |
| 11 | ·748 | ·582 | ·623 | 21·0 | 9·5 | 14·458 | 29·000 | ... | ... | ... | 14·66 | 13·50 | 42·08 | 39·08 | ... | 41·50 | E, calm, ESE, W . . . . | 0 to 3 | bc. bcm. |
| 12 | ·650 | ·700 | ·701 | 18·0 | 11·0 | 14·208 | 29·000 | ... | ... | ... | 14·33 | 12·66 | 45·16 | 41·00 | ... | 41·00 | WSW, W by S, SW, SW by S | 1 to 3 | bc. cos. os. |
| 13 | ·680 | ·535 | ·639 | 23·5 | 18·0 | 21·772 | 29·000 | ... | ... | ... | 22·00 | 21·50 | 46·08 | 41·66 | ... | 40·00 | SW, W, WSW, WNW . . | 1 to 6 | bc. cs. os. oms. oc. |
| 14 | ·650 | ·682 | ·673 | 23·0 | 19·0 | 21·400 | 29·000 | ... | ... | ... | 21·33 | 21·00 | 46·08 | 43·25 | ... | 40·00 | W, WSW, SW, SSW . . | 2 to 4 | oc. com. cm. c. bc. |
| 15 | ·668 | ·580 | ·612 | 22·5 | 17·0 | 19·416 | 29·000 | ... | ... | ... | 20·00 | 19·33 | 45·33 | 43·08 | ... | 40·00 | SSW, calm, NW . . . . | 0 to 4 | om. bc. c. cs. os. |
| 16 | ·722 | ·771 | ·744 | 18·5 | 12·0 | 16·250 | 28·937 | ... | ... | ... | 16·33 | 15·75 | 44·58 | 41·16 | ... | 40·00 | NW, W by N, W, SSW . . | 1 to 4 | bc. oc. bc. os. |
| 17 | ·970 | ·800 | ·821 | 19·0 | 14·0 | 16·916 | 29·000 | ... | ... | ... | 17·00 | 16·66 | 43·50 | 40·83 | ... | 39·50 | SW, calm, NE, N, NNE . | 0 to 3 | os. co. o. bc. |
| 18 | ·999 | 30·050 | 30·037 | 18·0 | Zero | 7·166 | 28·812 | ... | ... | ... | 7·25 | 6·66 | 43·41 | 40·91 | ... | 39·50 | NNE, calm . . . . . | 0 to 1 | bc. bf. |
| 19 | ·962 | 29·980 | 29·978 | 16·5 | 7·0 | 10·333 | 28·750 | ... | ... | ... | 10·65 | 10·32 | 42·50 | 40·83 | ... | 39·00 | Calm, SW, WNW, N, NNE | 0 to 2 | bf. bc. bcq. b. |
| 20 | ·910 | ·932 | ·927 | 16·0 | 5·0 | 11·208 | 28·500 | ... | ... | ... | 11·33 | 10·86 | 38·25 | 37·16 | ... | 39·00 | NW, calm, NE . . . . . | 0 to 1 | bc. b. |
| 21 | ·986 | ·950 | ·870 | 19·0 | 6·0 | 10·875 | 28·666 | ... | ... | ... | 11·00 | 10·33 | 38·16 | 35·66 | ... | 39·00 | Calm, WSW . . . . . | 0 to 1 | bc. b. |
| 22 | 30·028 | 30·028 | 30·040 | 18·0 | 13·0 | 13·958 | 28·958 | ... | ... | ... | 14·00 | 13·76 | 46·50 | 37·66 | ... | 39·50 | Calm, W, SW . . . . . | 0 to 2 | bc. bcm. ocm. o. |
| 23 | 29·820 | 29·932 | 29·914 | 21·0 | 20·0 | 20·416 | 28·708 | ... | ... | ... | 20·56 | 20·00 | 46·83 | 42·41 | ... | 40·00 | SW, SSW, S by E . . . | 1 to 5 | bc. oc. cos. oqs. |
| 24 | ·932 | ·861 | ·885 | 20·0 | 12·5 | 14·958 | 28·428 | ... | ... | ... | 15·00 | 14·66 | 43·91 | 43·66 | ... | 39·00 | SW by S, calm, NNE, S . | 0 to 4 | os. oc. com. om. o. |
| 25 | 30·038 | 30·000 | ·999 | 15·5 | 9·0 | 13·250 | 28·812 | ... | ... | ... | 13·33 | 12·85 | 44·50 | 43·83 | ... | 40·00 | S, S by E, ESE, SSE, SE by S | 2 to 4 | bc. bcq. coq. com. |
| 26 | ·038 | ·000 | ·999 | 18·0 | 11·0 | 13·708 | 28·812 | ... | ... | ... | 13·66 | 13·00 | 46·83 | 44·58 | ... | 40·00 | S, S by E, ESE, SSE, SE by S | 2 to 4 | bc. cq. com. so. |
| 27 | ·000 | ·030 | 30·028 | 18·0 | 9·0 | 14·416 | 28·857 | ... | ... | ... | 14·50 | 14·33 | 46·00 | 41·66 | ... | 40·50 | SE by S, SW, calm, ESE . | 0 to 2 | om. com. oc. bc. |
| 28 | ·050 | ·040 | ·037 | 12·0 | 3·0 | 6·270 | 28·750 | ... | ... | ... | 7·00 | 6·75 | 40·25 | 37·66 | 55·00 | 39·00 | SSE, S, SSW, SW by W . | 1 to 3 | bc. os. cq. com. |
| 29 | 29·950 | 29·950 | ·942 | 15·0 | 2·0 | 9·041 | 28·642 | ... | ... | ... | 9·33 | 8·76 | 46·75 | 48·25 | 55·66 | 39·00 | ESE, calm, E, SE . . . | 0 to 4 | bc. ocq. b. |
| 30 | ·572 | ·850 | ·801 | 21·0 | 4·5 | 13·041 | 28·625 | ... | ... | ... | 13·66 | 13·00 | 43·91 | 46·91 | 55·08 | 39·50 | SSE, E, SE . . . . . | 2 to 7 | com. coq. ocqms. |
| Max. | 30·050 | 30·050 | ... | 34·0 | ... | ... | 29·541 | ... | ... | ... | 29·66 | ... | 49·66 | 48·75 | ... | 44·00 | | | |
| Min. | 29·320 | 29·330 | ... | ... | Zero | ... | 28·428 | ... | ... | ... | 7·00 | ... | 38·16 | 38·66 | ... | 39·00 | | | |
| Mean | 29·798 | 29·797 | 29·867 | ... | ... | 17·004 | 28·943 | ... | ... | ... | 19·82 | 16·04 | 45·16 | 43·19 | ... | 40·66 | | | |

# OCTOBER, 1853.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Spirit Room. | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Mean Sea. | Shore. | | | Lower Deck. | | | | | | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | | Max. | Min. | Mean. | Mean Dry. | Mean Wet. | Bows. | Main Mast. | Gun Room. | | | | |
| Oct. 1 | 29·410 | 29·354 | 29·414 | 22·0 | 9·0 | 15·916 | 28·500 | ... | ... | ... | ... | ... | 47·50 | 44·66 | 56·75 | 39·50 | S, WSW, N, NW, W, SW | 1 to 10 | ocq. os. oms. fs. |
| 2 | ·360 | ·500 | ·422 | 17·0 | 5·5 | 10·750 | 28·500 | ... | ... | ... | ... | ... | 41·25 | 40·33 | 54·00 | 38·00 | NE, NNE, NNW, W . . | 1 to 6 | o. ocq. oq. b cm q. |
| 3 | ·332 | ·332 | ·339 | 13·0 | 5·0 | 8·750 | 29·500 | ... | ... | ... | ... | ... | 40·00 | 38·91 | 54·00 | 38·00 | WNW, W, WSW, SW . . | 2 to 6 | oc. oms. o s g. |
| 4 | ·376 | ·290 | ·324 | 14·0 | 5·0 | 9·450 | 28·500 | ... | ... | ... | ... | ... | 45·66 | 44·83 | 54·16 | 38·00 | SSW, SW, calm, S . . . | 0 to 7 | ocq. o mqs. bc. c. |
| 5 | ·562 | ·382 | ·421 | 12·0 | 1·5 | 6·750 | 28·500 | ... | ... | ... | ... | ... | 43·50 | 44·66 | 52·58 | 36·50 | S, calm, WNW, SW . . . | 0 to 5 | ocs. os. oms. o. |
| 6 | ·826 | ·700 | ·713 | 4·5 | -2·0 | 1·500 | 28·500 | ... | ... | ... | ... | ... | 46·00 | 43·58 | 51·00 | 35·00 | SW, ESE, calm, SW . . | 0 to 2 | bcm. bc. o. oms. |
| 7 | 30·010 | ·950 | ·964 | 5·0 | -9·0 | -1·416 | 28·500 | ... | ... | ... | ... | ... | 47·25 | 45·08 | 53·50 | 34·00 | SW, calm, WSW . . . . | 0 to 3 | om. oms. bc. f. |
| 8 | ·322 | 30·230 | 30·227 | 6·5 | 0·5 | 4·458 | 28·500 | ... | ... | ... | ... | ... | 47·58 | 46·66 | 51·50 | 34·00 | N, calm, SW, SE . . . . | 0 to 2 | om. o g s. oc. bc. |
| 9 | ·312 | ·296 | ·297 | 15·0 | 5·0 | 11·625 | 28·500 | Before this date | | | ... | ... | 46·41 | 47·00 | 49·91 | 34·00 | SE, calm . . . . . | 0 to 5 | bcm. b. bc. |
| 10 | 29·832 | ·208 | ·143 | 23·0 | 13·0 | 19·772 | 28·500 | the gale disturbed | | | ... | ... | 42·33 | 42·50 | 51·33 | 35·00 | SE, E, SSE, ESE, SE by E | 1 to 10 | bc. c. b oq. b oq m. |
| 11 | ·824 | 29·773 | 29·780 | 23·0 | 20·0 | 21·416 | 28·500 | the ice. | | | ... | ... | 38·25 | 37·58 | 45·50 | 33·00 | SE by E, SE, SSE . . . | 7 to 10 | om q. b cq. |
| 12 | ·704 | ·706 | ·724 | 26·5 | 21·0 | 22·916 | 28·500 | ... | ... | ... | ... | ... | 39·66 | 42·40 | 56·41 | 33·00 | SE, calm . . . . . | 0 to 8 | o q m. oc. oms. |
| 13 | ·760 | ·710 | ·721 | 25·5 | 22·0 | 24·125 | 28·500 | ... | ... | ... | ... | ... | 48·16 | 48·33 | 57·33 | 35·00 | S, SE, E, NE . . . . . | 1 to 4 | oc. om. bc. |
| 14 | ·850 | ·800 | ·807 | 22·5 | 19·0 | 20·416 | 28·583 | ... | ... | ... | ... | ... | 49·16 | 48·91 | 59·16 | 36·00 | Calm, SE . . . . . | 0 to 1 | bc. om. bcm. |
| 15 | ·944 | ·926 | ·918 | 23·5 | 22·0 | 22·791 | 28·800 | ... | ... | ... | ... | ... | 51·83 | 51·83 | 60·16 | 35·50 | SW, calm, SSW, S, E, SE . | 0 to 1 | o. m. |
| 16 | ·936 | ·950 | ·940 | 23·0 | 20·5 | 21·708 | 29·000 | ... | ... | ... | ... | ... | 50·16 | 49·50 | 59·41 | 35·00 | E, SE, ENE, SSE . . . | 1 to 3 | o. |
| 17 | ·911 | ·884 | ·902 | 22·0 | 17·0 | 18·541 | 28·500 | ... | ... | ... | ... | ... | 48·08 | 48·41 | 58·00 | 35·00 | E, SE, SSW . . . . . | 1 to 4 | o. f. oc. |
| 18 | ·992 | ·948 | ·950 | 20·5 | 18·5 | 19·583 | 28·750 | ... | ... | ... | ... | ... | 48·00 | 47·41 | 58·66 | 34·50 | SSW, SSE, NE, calm . . | 0 to 2 | oms. oc. om. |
| 19 | 30·050 | 30·034 | 30·034 | 17·0 | 1·5 | 6·291 | 28·500 | ... | ... | ... | ... | ... | 44·33 | 45·00 | 55·66 | 34·00 | N, NE, calm, WNW, NW . | 0 to 2 | oc. b. |
| 20 | ·061 | ·023 | ·033 | 10·0 | Zero | 4·166 | 28·500 | 16·5 | 1·5 | 6·12 | ... | ... | 42·58 | 43·91 | 52·91 | 34·00 | Calm, N, NE, NW . . . | 0 to 3 | om. b. bcm. o. |
| 21 | ·226 | ·142 | ·137 | 2·5 | -3·0 | -0·041 | 28·500 | 7·0 | -5·0 | -0·83 | ... | ... | 39·16 | 38·50 | 53·00 | 33·00 | Calm, NW, NE . . . . | 0 to 1 | bc. b. bcq. |
| 22 | ·270 | ·324 | ·296 | 2·5 | -2·5 | -0·458 | 28·500 | -1·0 | -8·0 | -4·39 | ... | ... | 38·83 | 40·08 | 53·00 | 33·00 | N, calm, W, SW, NW . . | 0 to 3 | bc. oc. ocm. oms. |
| 23 | ·000 | ·108 | ·105 | 11·0 | 3·0 | 7·875 | 28·500 | 1·5 | -6·5 | -3·62 | ... | ... | 43·16 | 43·91 | 54·08 | 33·50 | WSW, SW . . . . . | 1 to 6 | oms. o mqs. o mcq. |
| 24 | ·010 | 29·950 | 29·968 | 10·5 | 8·0 | 9·458 | 28·500 | 9·0 | 2·5 | 7·00 | ... | ... | 44·83 | 45·16 | 55·50 | 33·00 | WSW, SW, calm . . . . | 0 to 5 | cm. om. o mq. |
| 25 | ·160 | 30·100 | 30·110 | 8·0 | -1·0 | 4·750 | 28·500 | 10·0 | 3·5 | 7·45 | ... | ... | 47·16 | 47·50 | 55·16 | 33·50 | SW, E, calm . . . . . | 0 to 3 | om. c. bc. o. |
| 26 | 29·914 | ·054 | ·049 | 3·0 | -4·0 | 0·050 | 28·500 | 4·0 | -6·5 | -1·37 | ... | ... | 46·41 | 47·16 | 52·00 | 33·00 | Calm, NNE, NE, E . . . | 0 to 2 | om. co. bc. bcm. |
| 27 | ·810 | 29·824 | 29·832 | 4·0 | -2·0 | 0·458 | 28·500 | 1·0 | -11·5 | -4·54 | ... | ... | 46·58 | 46·75 | 47·91 | 32·50 | NE, calm, SE, S . . . . | 0 to 1 | bc. cm. om. bcm. |
| 28 | ·730 | ·790 | ·783 | Zero | -4·0 | -1·458 | 28·500 | -1·0 | -12·5 | -6·04 | ... | ... | 45·25 | 45·50 | 49·83 | 33·00 | Calm, S, ESE, SE . . . . | 0 to 4 | bc. omg. om. oc. |
| 29 | ·818 | ·670 | ·677 | 7·0 | -0·5 | 1·791 | 28·500 | -5·0 | -11·0 | -7·20 | ... | ... | 46·91 | 46·91 | 49·66 | 33·00 | Calm, NE, ESE . . . . | 0 to 2 | oms. om. of. o g s. |
| 30 | ·670 | ·636 | ·642 | 5·0 | -6·0 | 1·416 | 28·500 | 1·0 | - 5·0 | -2·25 | ... | ... | 47·16 | 47·66 | 53·00 | 33·50 | Calm, NNW . . . . . | 0 to 2 | om. com. bc. |
| 31 | ·618 | ·696 | ·736 | 5·0 | -6·0 | 1·416 | 28·500 | -2·0 | -18·0 | -6·20 | ... | ... | 47·16 | 47·66 | 50·00 | 33·50 | Calm, NNW . . . . . | 0 to 2 | bc. om. com. |
| Max. | 30·322 | 30·324 | ... | 26·0 | ... | ... | 28·500 | ... | ... | ... | ... | ... | 48·08 | 51·83 | 60·16 | 39·50 | | | |
| Min. | 29·332 | 29·332 | ... | ... | -9·0 | ... | 28·500 | ... | ... | ... | ... | ... | 38·25 | 37·58 | 45·50 | 32·50 | | | |
| Mean | 29·851 | 29·848 | 29·851 | ... | ... | 9·508 | 28·500 | ... | ... | ... | ... | ... | 45·14 | 45·10 | 53·71 | 34·53 | | | |

# NOVEMBER, 1853.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | | | | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | Direction. | Force. | |
| Nov. 1 | 29·650 | 29·696 | 29·681 | 2·0 | − 9·0 | − 4·160 | 7·0 | −21·0 | − 7·58 | 46·66 | 45·33 | 52·16 | 52·583 | ... | 40·50 | ... | NNE, NNW, NE | 1 to 4 | om. bc. com. om g. |
| 2 | ·714 | ·650 | ·662 | 4·5 | − 1·0 | 2·625 | 4·0 | − 1·5 | − 1·29 | 43·83 | 43·33 | 43·83 | 46·583 | ... | 39·00 | ... | N, NE, NNE | 2 to 6 | om. com d. om s. |
| 3 | ·650 | ·710 | ·696 | 5·0 | 2·0 | 3·541 | 1·0 | − 6·0 | − 2·12 | 45·83 | 45·50 | 51·50 | 48·083 | ... | 40·00 | ... | NE, WNW, NNW | 1 to 2 | bc. bem. om. |
| 4 | ·638 | ·610 | ·618 | 4·0 | 3·0 | 3·583 | 2·0 | − 4·0 | − 1·27 | 49·66 | 48·50 | 54·00 | 50·250 | ... | 40·00 | ... | Calm, NNW, NW, NNE | 0 to 2 | com. om. om s. |
| 5 | ·700 | ·684 | ·678 | 9·0 | 4·0 | 6·500 | 2·0 | − 3·0 | − 0·37 | 49·16 | 49·00 | 51·66 | 51·333 | ... | 40·50 | ... | NNE, calm, NNW, ENE | 0 to 2 | om. m. com. om s. |
| 6 | ·600 | ·640 | ·639 | 9·0 | 4·0 | 6·083 | 1·0 | −12·5 | − 6·12 | 50·50 | 51·83 | 54·83 | 51·416 | ... | 41·00 | ... | NNW, calm, NW | 0 to 3 | om s. om. com. |
| 7 | ·880 | ·750 | ·749 | 5·0 | − 1·5 | 2·125 | − 6·0 | −18·5 | −12·00 | 49·66 | 51·50 | 56·33 | 53·833 | ... | 41·00 | ... | Calm, S. | 0 to 1 | om s. om. bc. m. |
| 8 | 30·050 | ·950 | ·954 | 2·0 | −15·0 | − 8·916 | −15·5 | −33·0 | −27·53 | 46·66 | 47·16 | 55·66 | 51·250 | ... | 42·00 | ... | Calm, S, ENE, SE, SSE | 0 to 1 | com. bc. b. |
| 9 | 29·883 | 30·086 | 30·027 | −10·0 | −15·0 | −12·333 | −21·0 | −33·0 | −27·58 | 46·83 | 47·66 | 51·00 | 49·333 | 28·62 | 41·00 | ... | SSE, calm | 0 to 1 | bc. bem. f. fs. |
| 10 | ·470 | 29·561 | 29·580 | − 4·0 | −11·0 | − 8·583 | −14·0 | −28·0 | −21·87 | 47·66 | 49·00 | 50·16 | 51·083 | 29·16 | 41·50 | ... | Calm, SSE, WNW, SW | 0 to 3 | fs. bc. om. om g. |
| 11 | ·402 | ·510 | ·477 | − 3·0 | − 8·0 | − 5·000 | −12·5 | −14·0 | −13·41 | 47·83 | 48·66 | 48·50 | 49·750 | 28·66 | 41·00 | ... | SW, SSW, S | 1 to 7 | om. om s. com q. |
| 12 | ·608 | ·460 | ·479 | − 3·0 | −11·0 | − 7·833 | −14·0 | −23·0 | −17·50 | 46·00 | 46·91 | 51·33 | 46·750 | 27·16 | 41·50 | ... | SW, calm, S, SSE, S by E | 0 to 7 | com. bem. mq. |
| 13 | ·950 | ·764 | ·792 | − 4·0 | −10·0 | − 7·666 | −13·5 | −17·5 | −14·58 | 47·83 | 49·33 | 50·83 | 45·333 | 24·66 | 41·00 | ... | S by E, SE, SSE | 2 to 8 | om q. bc q d. bem q. |
| 14 | 30·210 | 30·120 | 30·130 | − 6·0 | −14·0 | −11·083 | −14·0 | −20·0 | −17·62 | 43·83 | 45·00 | 48·83 | 47·250 | 20·83 | 40·50 | ... | SE, S, N | 1 to 6 | bem. cmq. bcq. |
| 15 | ·232 | ·220 | ·222 | − 6·0 | −13·5 | −10·583 | −22·0 | −29·5 | −24·75 | 44·00 | 45·33 | 51·33 | 49·333 | 22·50 | 40·00 | ... | Calm, SE, NW, S | 0 to 1 | bc. |
| 16 | ·102 | ·182 | ·178 | − 9·0 | −14·0 | −11·291 | −19·0 | −27·0 | −23·10 | 46·50 | 46·50 | 51·50 | 50·666 | 24·50 | 39·00 | ... | Calm, W | 0 to 1 | bc. bm. om. |
| 17 | ·050 | ·046 | ·053 | − 4·0 | −10·0 | − 5·875 | −15·0 | −24·5 | −18·75 | 47·83 | 47·83 | 51·16 | 50·750 | 21·16 | 39·50 | ... | Calm, W, WNW, NW, S | 1 to 2 | bc. co. c. com. |
| 18 | 29·864 | 29·973 | 29·966 | − 2·0 | − 7·0 | − 4·708 | −14·0 | −23·5 | −17·83 | 46·66 | 47·08 | 50·33 | 52·250 | 22·66 | 39·00 | ... | Calm, SW, S, W | 0 to 2 | om. bc. co. |
| 19 | ·812 | ·850 | ·841 | − 4·0 | − 8·0 | − 6·000 | −16·0 | −26·0 | −21·45 | 47·00 | 48·16 | 52·00 | 52·416 | 18·83 | 39·50 | ... | SW, calm, SE, S, SSE | 0 to 3 | om. bc. |
| 20 | ·706 | ·710 | ·728 | − 6·5 | −10·0 | − 8·541 | −14·0 | −24·0 | −17·62 | 43·50 | 44·83 | 51·16 | 51·500 | 16·33 | 39·00 | ... | SSE, S, S by E | 3 to 8 | co. cos. om. bem g. |
| 21 | ·701 | ·720 | ·713 | − 5·0 | −12·0 | − 9·541 | −17·0 | −22·0 | −21·16 | 41·66 | 43·83 | 48·33 | 49·666 | 16·33 | 39·50 | ... | S, SSE, S by E, SE | 3 to 7 | om g. bm. cg. bem. |
| 22 | ·800 | ·730 | ·586 | − 9·0 | −15·0 | −13·500 | −23·0 | −26·0 | −24·62 | 42·83 | 42·33 | 49·16 | 50·916 | 12·16 | 38·00 | ... | S, SE, ESE, calm, SE | 0 to 5 | om. bem. b. bem q. |
| 23 | ·950 | ·900 | ·898 | −13·0 | −15·0 | −14·375 | −26·0 | −34·0 | −29·70 | 42·00 | 42·41 | 49·83 | 48·916 | 21·66 | 38·00 | ... | NE, calm, N, SE, SSE | 0 to 1 | bc. bem. b. |
| 24 | ·966 | ·960 | ·953 | −14·0 | −18·0 | −16·333 | −31·0 | −36·5 | −33·04 | 42·50 | 42·33 | 51·33 | 49·000 | 20·00 | 38·50 | ... | SSE, calm, SE, NE, S | 0 to 2 | co. b. bc. |
| 25 | ·910 | ·966 | ·950 | −16·0 | −22·0 | −19·250 | −34·0 | −37·0 | −35·45 | 43·33 | 45·33 | 51·50 | 47·833 | 20·16 | 38·00 | ... | SE, NE, ENE, calm | 0 to 4 | b. oc m. co. |
| 26 | ·712 | ·860 | ·837 | −16·0 | −21·0 | −19·541 | −30·0 | −36·0 | −32·37 | 42·33 | 43·66 | 48·83 | 46·833 | 18·16 | 38·00 | ... | Calm, WSW | 0 to 1 | b. |
| 27 | ·470 | ·650 | ·618 | −14·0 | −17·0 | −15·833 | −28·0 | −33·0 | −30·12 | 45·50 | 45·33 | 51·00 | 48·500 | 25·83 | 38·50 | ... | N, calm, NE, SE, SW | 0 to 2 | b. bc. bem. c. |
| 28 | ·368 | ·330 | ·361 | − 7·0 | −15·0 | −10·750 | −15·0 | −29·5 | −22·87 | 44·00 | 47·33 | 50·83 | 50·000 | 27·00 | 37·00 | ... | Calm, SE, SW | 0 to 2 | c. bc. bem. co. |
| 29 | ·480 | ·518 | ·490 | − 5·0 | − 9·0 | − 7·166 | −13·5 | −22·0 | −19·20 | 47·00 | 47·91 | 50·16 | 48·583 | 24·83 | 37·50 | ... | SW, calm, SSE, SSW | 0 to 3 | bc. b. bm. co. o. |
| 30 | ·700 | ·500 | ·542 | − 4·0 | −12·0 | − 7·875 | −12·0 | −20·5 | −16·87 | 46·33 | 47·58 | 50·58 | 47·250 | 25·50 | 37·00 | ... | SSW, S, SSE, N to calm | 0 to 8 | om. com. bem q. |
| Max. | 30·232 | 30·220 | ... | 9·0 | ... | ... | 7·0 | ... | ... | 50·50 | 51·83 | 56·33 | 58·000 | ... | 42·00 | | | | |
| Min. | 29·368 | 29·330 | ... | ... | −22·0 | ... | ... | −37·0 | ... | 41·66 | 42·33 | 48·33 | 33·000 | ... | 37·00 | | | | |
| Mean | 29·765 | 29·777 | 29·770 | ... | ... | − 7·409 | ... | ... | −18·33 | 45·83 | 46·56 | 51·16 | 49·308 | 22·53 | 39·20 | | | | |

Capstan liable to cold blasts.

# DECEMBER, 1853.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | Direction. | Force. | |
| Dec. 1 | 29·680 | 29·540 | 29·720 | − 7·0 | −11·0 | − 8·833 | −18·5 | −24·0 | −21·08 | 46·50 | 48·33 | 50·66 | 48·666 | 28·33 | 37·00 | 55·00 | N, calm | 0 to 1 | bc. bcm. b. |
| 2 | ·540 | ·750 | ·552 | − 7·0 | −13·0 | −10·000 | −19·0 | −27·0 | −23·04 | 46·66 | 48·33 | 49·50 | 49·583 | 26·66 | 37·00 | 56·00 | Calm, SSE, SE, N | 0 to 3 | bc. bcm. bmq. b. |
| 3 | ·600 | ·550 | ·554 | − 3·5 | − 7·0 | − 5·875 | −15·0 | −20·0 | −17·25 | 49·16 | 51·66 | 53·00 | 49·250 | 29·00 | 37·50 | 55·00 | Calm, ENE, E, S, SSE | 0 to 2 | bm. b. bcm. oms. |
| 4 | ·830 | ·702 | ·772 | − 2·0 | − 9·0 | − 4·541 | −16·0 | −31·0 | −22·79 | 48·83 | 52·00 | 54·16 | 50·416 | 33·16 | 37·00 | 56·00 | S, SE, ESE, calm | 0 to 2 | bc. om. b cm. |
| 5 | ·800 | ·877 | ·849 | −13·0 | −17·0 | −15·750 | −31·0 | −35·5 | −33·66 | 43·91 | 46·41 | 50·08 | 51·416 | 23·33 | 37·00 | 52·00 | SE, calm | 0 to 3 | bc. bcm. bco. bm. |
| 6 | ·750 | ·762 | ·753 | −12·0 | −17·0 | −14·583 | −31·0 | −35·0 | −32·70 | 44·83 | 46·83 | 51·66 | 49·916 | 22·50 | 37·00 | 50·00 | SSE, S, calm, W, WSW | 0 to 2 | bc. bm. |
| 7 | ·812 | ·808 | ·798 | −13·0 | −16·0 | −14·333 | −29·0 | −33·0 | −31·04 | 45·50 | 46·00 | 48·83 | 50·333 | 23·33 | 37·00 | 50·00 | WSW, calm, S, SSE | 0 to 1 | co. bc. om. com. |
| 8 | ·760 | ·770 | ·776 | −15·0 | −22·0 | −18·666 | −32·5 | −37·0 | −34·58 | 42·75 | 44·58 | 48·50 | 49·166 | 19·83 | 37·00 | 49·00 | Calm, W, NW, SSE | 0 to 5 | bc. bcm. bm. bmq. |
| 9 | ·880 | ·780 | ·804 | −20·0 | −23·0 | −21·250 | −29·0 | −35·0 | −32·00 | 41·58 | 42·41 | 48·66 | 46·500 | 17·33 | 37·00 | 46·00 | SE, SSE, calm | 0 to 5 | bc. b. b m. |
| 10 | 30·116 | 30·002 | 30·019 | −19·0 | −24·0 | −21·083 | −34·5 | −38·0 | −36·25 | 48·33 | 49·08 | 49·33 | 47·666 | 26·33 | 37·00 | 49·00 | Calm, SSE, S, SE | 0 to 1 | b. com. bc. |
| 11 | ·112 | ·160 | ·144 | −18·0 | −22·0 | −20·416 | −25·0 | −40·0 | −36·95 | 48·50 | 51·08 | 48·50 | 49·333 | 28·33 | 37·00 | 55·00 | SE, ESE, calm | 0 to 1 | bc. b. |
| 12 | ·050 | ·050 | ·074 | −15·0 | −23·0 | −19·375 | −27·0 | −39·0 | −33·66 | 47·16 | 49·75 | 49·33 | 49·333 | 28·50 | 37·00 | 55·00 | S, SSE, SW, ESE | 1 to 2 | b. c. om. |
| 13 | ·024 | ·060 | ·046 | −12·0 | −18·0 | −15·416 | −20·5 | −32·5 | −28·04 | 47·16 | 48·75 | 47·33 | 48·583 | 27·16 | 37·00 | 53·00 | Calm, SSE, ESE, S | 0 to 2 | b. bc. |
| 14 | ·074 | ·040 | ·044 | − 6·0 | −12·0 | − 9·666 | −19·0 | −27·0 | −23·66 | 47·33 | 49·16 | 50·66 | 48·583 | 30·16 | 37·00 | 55·00 | SSE, S, calm, NW | 0 to 2 | e. o. c. bc. o m. |
| 15 | ·050 | ·084 | ·070 | − 9·0 | −13·0 | −11·416 | −27·0 | −31·0 | −29·25 | 48·00 | 50·16 | 50·83 | 50·083 | 27·33 | 37·00 | 55·00 | Calm, S, S by W, SSE, SE | 0 to 1 | bc. o m. c. |
| 16 | 29·950 | ·020 | ·008 | − 7·0 | −12·0 | − 9·666 | −21·0 | −30·0 | −24·91 | 48·16 | 50·50 | 53·16 | 52·666 | 31·33 | 37·00 | 53·00 | Calm, S, W, NNW, SW | 0 to 2 | om. o m c. c s. o s. |
| 17 | ·900 | 29·814 | 29·901 | −10·0 | −19·0 | −15·000 | −32·0 | −39·0 | −36·45 | 48·50 | 50·50 | 53·16 | 52·250 | 29·33 | 37·00 | 54·00 | SE, calm, E | 0 to 2 | bc. b. |
| 18 | ·914 | ·900 | ·901 | −16·0 | −23·0 | −19·125 | −33·0 | −37·0 | −35·41 | 46·16 | 48·33 | 46·50 | 49·250 | 28·00 | 37·00 | 53·00 | Calm, SE, S, SSW | 0 to 1 | b. bc. bv. |
| 19 | ·900 | ·906 | ·901 | −10·0 | −19·0 | −15·541 | −16·0 | −35·0 | −25·41 | 44·25 | 46·33 | 47·33 | 46·666 | 22·66 | 37·00 | 51·00 | Calm, NW, SE, SE by E | 0 to 7 | om. bc. b. b m. |
| 20 | ·570 | ·723 | ·710 | − 9·0 | −13·0 | −10·708 | −17·0 | −30·5 | −23·66 | 45·83 | 48·33 | 49·00 | 49·666 | 28·16 | 37·00 | 52·00 | Calm, SW | 0 to 2 | bc. om. b. |
| 21 | ·820 | ·700 | ·700 | −10·0 | −19·0 | −15·250 | −25·0 | −37·0 | −30·87 | 46·33 | 48·33 | 49·50 | 49·000 | 26·66 | 37·00 | 52·00 | SW, calm, W, SSW, S, SE | 0 to 5 | bc. om. b cm. oc. |
| 22 | ·608 | ·750 | ·723 | −11·0 | −16·0 | −14·500 | −20·0 | −31·0 | −25·25 | 46·16 | 49·16 | 49·33 | 47·500 | 26·33 | 37·00 | 53·00 | SW, NW, calm, SE, ESE | 0 to 4 | e om. o m. b mq. |
| 23 | ·770 | ·676 | ·687 | −12·0 | −15·0 | −13·750 | −30·0 | −35·0 | −31·54 | 46·33 | 49·00 | 50·33 | 50·000 | 29·16 | 38·00 | 54·00 | S, SSE, SE | 1 to 4 | oc. b. b cm. o m g. |
| 24 | 30·020 | ·850 | ·887 | −10·0 | −20·0 | −16·250 | −22·0 | −38·0 | −30·79 | 46·66 | 47·83 | 50·16 | 49·333 | 27·83 | 38·00 | 54·00 | SSE, SE, S | 1 to 6 | bc m. c m. bm. |
| 25 | 29·926 | ·950 | ·974 | − 7·0 | −16·0 | −11·833 | −16·0 | −25·0 | −20·00 | 48·83 | 49·33 | 49·66 | 47·500 | 26·00 | 38·00 | 54·00 | SE, SSE | 3 to 6 | c. b cm. b m q. o m. |
| 26 | 30·150 | 30·010 | 30·082 | − 7·0 | −17·0 | −12·750 | −19·0 | −28·5 | −25·91 | 47·00 | 49·33 | 47·33 | 48·916 | 27·66 | 38·00 | 54·00 | SSE, SE, calm | 0 to 5 | eqo. eq. b m. beq. |
| 27 | 29·400 | 29·724 | 29·677 | − 9·0 | −17·0 | −12·333 | −21·0 | −32·0 | −26·16 | 47·50 | 47·50 | 47·66 | 46·916 | 27·33 | 38·00 | 54·00 | Calm, W, S, NW | 0 to 2 | om. b m. b cm. |
| 28 | 30·100 | ·650 | ·718 | −10·0 | −23·0 | −16·791 | −26·5 | −46·0 | −40·33 | 46·50 | 48·16 | 49·00 | 50·833 | 27·83 | 38·00 | 54·00 | NW, W, SW, calm, S | 0 to 3 | om q. b cm. com. |
| 29 | ·500 | 30·442 | 30·423 | −21·0 | −27·0 | −24·333 | −35·0 | −46·5 | −43·04 | 44·83 | 47·33 | 49·16 | 49·333 | 27·16 | 37·00 | 56·00 | SE, S, calm, SW, SE | 0 to 4 | b. b m. |
| 30 | 29·916 | ·200 | ·184 | − 8·0 | −21·0 | −14·583 | − 7·0 | −29·0 | −17·62 | 42·66 | 45·33 | 47·33 | 46·333 | 22·33 | 37·00 | 54·00 | SSE, SE | 2 to 9 | eqo. eq. b cm q. |
| 31 | ·692 | 29·370 | 29·645 | 12·0 | − 5·0 | 2·333 | 12·0 | − 7·0 | 2·83 | 44·50 | 46·33 | 48·16 | 44·166 | 25·16 | 37·00 | 51·00 | Calm, SE, SSE, E | 0 to 9 | os. o m. c om. o m q. |
| Max. | 30·500 | 30·442 | ... | 12·0 | ... | ... | 12·0 | ... | ... | 49·16 | 52·00 | 54·16 | 55·000 | 33·16 | 38·00 | 56·00 | } Sylvester Region. | | |
| Min. | 29·400 | 29·550 | ... | ... | −27·0 | ... | ... | −46·5 | ... | 41·58 | 42·41 | 47·33 | 34·000 | 17·33 | 37·00 | 45·00 | | | |
| Mean | 29·884 | 29·858 | 29·899 | ... | ... | −13·740 | ... | ... | −26·08 | 43·11 | 48·26 | 49·93 | 49·005 | 23·43 | 37·21 | 53·00 | | | |

# JANUARY, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | | | |
| Jan. 1 | 28·990 | 29·050 | 29·095 | 25·0 | 14·0 | 18·541 | 25·0 | 14·00 | 18·41 | 47·33 | 49·00 | 51·50 | 44·916 | 27·00 | 38·0 | 52·0 | E, ENE | 4 to 10 | o m q. |
| 2 | 29·550 | ·300 | ·316 | 22·0 | 10·0 | 17·708 | 26·0 | − 2·50 | 7·50 | 54·33 | 57·33 | 57·83 | 49·833 | 39·00 | 38·0 | 57·0 | SE, calm, E, S | 0 to 4 | os. o m. o m s. o m q. |
| 3 | ·650 | ·660 | ·644 | 12·0 | − 7·0 | − 0·375 | − 7·0 | −21·00 | −15·41 | 50·16 | 51·66 | 57·33 | 53·083 | 31·00 | 38·0 | 54·0 | SE, S, SSE, calm | 0 to 6 | b c. b c m q. b m. |
| 4 | ·560 | ·616 | ·604 | 1·0 | − 8·0 | − 4·833 | −18·5 | −28·50 | −24·62 | 52·00 | 53·50 | 56·16 | 52·416 | 33·50 | 38·0 | 54·0 | SSE, calm, S, SE | 0 to 2 | b c. b. b c m. c o. |
| 5 | ·502 | ·522 | ·529 | − 5·5 | −10·5 | − 8·416 | −27·5 | −35·00 | −31·45 | 50·00 | 51·50 | 53·66 | 51·500 | 31·33 | 39·0 | 54·0 | W, calm, SE, SSE | 0 to 1 | o. b c. |
| 6 | ·670 | ·490 | ·530 | − 5·0 | − 7·0 | − 6·666 | −24·0 | −30·00 | −26·70 | 49·66 | 50·33 | 54·33 | 51·500 | 33·33 | 39·0 | 55·0 | Calm, S, SW, SE | 0 to 2 | m. b c m. o m. b m. |
| 7 | ·864 | ·800 | ·800 | − 7·0 | −14·0 | −10·083 | −25·0 | −33·00 | −29·83 | 49·00 | 46·83 | 51·83 | 53·333 | 30·16 | 39·0 | 54·0 | SSE, calm, SE | 0 to 2 | b c. b c m. b m. |
| 8 | ·900 | ·864 | ·837 | −14·0 | −21·0 | −16·583 | −34·0 | −38·00 | −36·29 | 47·83 | 49·33 | 53·66 | 51·416 | 29·50 | 40·0 | 54·0 | SSE, calm | 0 to 3 | b c. b m. b. c o. |
| 9 | 30·020 | 30·010 | 30·001 | −15·5 | −22·0 | −18·208 | −37·5 | −45·00 | −41·33 | 46·33 | 49·00 | 51·83 | 49·625 | 28·16 | 39·0 | 55·0 | Calm, SE | 0 to 3 | b c. b. |
| 10 | 29·878 | 29·950 | 29·947 | −20·0 | −22·0 | −21·333 | −43·5 | −45·00 | −44·66 | 47·16 | 48·16 | 51·00 | 47·583 | 26·50 | 40·0 | 54·0 | Calm | 0 | b. |
| 11 | ·850 | ·880 | ·875 | −19·0 | −23·0 | −20·708 | −40·0 | −44·00 | −41·62 | 46·16 | 47·16 | 53·16 | 48·166 | 27·33 | 40·0 | 54·0 | Calm | 0 | b c m. b. |
| 12 | ·900 | ·860 | ·864 | −16·0 | −20·0 | −18·916 | −40·0 | −43·00 | −41·58 | 46·66 | 47·16 | 52·66 | 48·083 | 27·33 | 40·0 | 54·0 | Calm | 0 | b. b c. |
| 13 | ·820 | ·920 | ·906 | −17·0 | −21·0 | −19·250 | −39·0 | −43·50 | −41·25 | 47·66 | 47·50 | 51·50 | 47·666 | 27·33 | 38·0 | 54·0 | Calm, SE | 0 to 1 | b. b c. |
| 14 | ·610 | ·604 | ·655 | −15·0 | −23·0 | −19·416 | −27·5 | −44·00 | −37·54 | 46·33 | 47·83 | 49·66 | 47·916 | 27·00 | 39·0 | 52·0 | SE, calm, SSE | 0 to 2 | b. b c. o c. |
| 15 | ·490 | ·590 | ·562 | −14·0 | −17·0 | −15·333 | −28·0 | −37·50 | −32·79 | 47·50 | 50·33 | 51·83 | 48·250 | 31·16 | 38·0 | 57·0 | Calm, NW, SE | 0 to 1 | c o m. b m. b c. |
| 16 | ·678 | ·574 | ·593 | −15·0 | −19·0 | −16·083 | −35·0 | −40·70 | −38·37 | 46·00 | 48·66 | 53·00 | 45·666 | 28·33 | 39·0 | 53·0 | Calm, SW, S | 0 to 1 | b c. c. |
| 17 | ·824 | ·783 | ·780 | −16·0 | −22·0 | −19·333 | −43·0 | −49·70 | −46·75 | 45·83 | 49·66 | 49·66 | 44·500 | 29·50 | 38·0 | 53·0 | S, calm | 0 to 1 | b c. b m. o c. b m. |
| 18 | ·854 | ·855 | ·851 | −21·0 | −23·0 | −22·125 | −46·0 | −50·25 | −47·79 | 45·66 | 47·33 | 50·33 | 46·416 | 30·16 | 38·0 | 54·0 | S, calm | 0 to 1 | b m. m. b c m. c m. |
| 19 | ·800 | ·810 | ·821 | −21·0 | −25·0 | −23·416 | −49·0 | −53·25 | −50·33 | 46·83 | 48·00 | 50·83 | 45·416 | 27·33 | 38·0 | 54·0 | Calm, SSE, S | 0 to 1 | c o. c o m. b m. b c. |
| 20 | ·850 | ·868 | ·856 | −22·0 | −28·0 | −25·000 | −50·5 | −54·25 | −52·45 | 46·33 | 47·50 | 50·83 | 46·416 | 29·50 | 37·0 | 54·0 | Calm | 0 | b c. b. |
| 21 | ·720 | ·750 | ·750 | −26·0 | −27·0 | −26·500 | −49·0 | −54·75 | −52·20 | 45·83 | 47·66 | 50·50 | 44·583 | 27·50 | 37·0 | 53·0 | Calm, S, SSE | 0 to 2 | b m. c o m. b. b c. |
| 22 | ·680 | ·714 | ·708 | −21·0 | −26·0 | −24·375 | −39·5 | −49·25 | −44·45 | 44·83 | 46·50 | 50·50 | 45·916 | 26·16 | 38·0 | 54·0 | S, calm, SSW, SE | 0 to 3 | b. b m. b c m. b v. |
| 23 | ·284 | ·530 | ·509 | −17·0 | −22·0 | −19·833 | −29·0 | −40·25 | −34·83 | 43·50 | 46·33 | 52·83 | 42·750 | 25·83 | 37·0 | 54·0 | SSW, SW, N | 1 to 4 | b c. b m. o. c o m. |
| 24 | ·214 | ·224 | ·234 | −11·0 | −17·0 | −13·583 | −27·0 | −32·25 | −29·33 | 43·83 | 52·66 | 54·66 | 44·166 | 33·83 | 37·0 | 57·0 | N, NNW, NW | 1 to 3 | o m. c o m. b c m. |
| 25 | ·330 | ·274 | ·281 | −12·5 | −19·0 | −15·791 | −33·0 | −42·75 | −37·95 | 48·83 | 50·83 | 53·83 | 46·416 | 28·16 | 37·0 | 54·0 | N, NW, calm, NNW | 0 to 2 | b c. c o. b m. |
| 26 | ·600 | ·472 | ·481 | −18·0 | −25·0 | −22·166 | −44·0 | −51·25 | −48·54 | 46·00 | 47·16 | 51·83 | 47·666 | 23·00 | 37·0 | 53·0 | NNW, SW, WNW, calm | 0 to 1 | b. b m. c o m. b c m. |
| 27 | ·590 | ·630 | ·619 | −26·0 | −34·0 | −28·375 | −51·0 | −53·75 | −52·91 | 44·66 | 46·00 | 49·16 | 46·416 | 20·66 | 37·0 | 54·0 | W, calm | 0 to 1 | c o. b c. b m. |
| 28 | ·560 | ·590 | ·584 | −31·0 | −38·0 | −35·416 | −55·0 | −59·25 | −57·12 | 45·16 | 44·33 | 49·33 | 48·666 | 19·33 | 35·0 | 53·0 | Calm | 0 | b m. b. |
| 29 | ·600 | ·560 | ·573 | −32·0 | −38·0 | −35·416 | −55·0 | −59·25 | −57·12 | 44·00 | 45·83 | 47·83 | 45·166 | 23·00 | 36·0 | 52·0 | SE, SW, SSE | 1 | b c. b m. |
| 30 | ·760 | ·720 | ·712 | −31·0 | −34·0 | −32·291 | −51·0 | −55·75 | −53·87 | 41·66 | 43·66 | 48·33 | 41·583 | 21·66 | 35·0 | 52·0 | SSE, calm, SSW | 0 to 2 | b. b c. b m. |
| 31 | ·778 | ·770 | ·765 | −18·0 | −33·0 | −22·416 | −28·0 | −51·25 | −35·50 | 43·66 | 46·33 | 48·50 | 42·750 | 25·50 | 35·0 | 53·0 | Calm, SSW, SSE, S, ESE | 0 to 1 | b m. b c. o m. s. o m. |
| Max. | 30·020 | 30·010 | ... | 25·0 | ... | ... | 26·0 | ... | ... | 54·33 | 57·33 | ... | ... | ... | 40·0 | 57·0 | | | |
| Min. | 28·990 | 29·050 | ... | ... | −38·0 | ... | ... | −59·25 | ... | 41·66 | 43·66 | ... | ... | ... | 35·0 | 52·0 | | | |
| Mean | 29·657 | 29·652 | 29·657 | ... | ... | −16·971 | ... | ... | 37·38 | 46·89 | 48·53 | 51·92 | ... | 28·83 | 38·0 | 53·9 | | | |

# FEBRUARY, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | Direction. | Force. | |
| Feb. 1 | 29·750 | 29·764 | 29·758 | −17·0 | −22·0 | −19·833 | −37·0 | −43·25 | −40·37 | 44·00 | 46·50 | 51·33 | 45·833 | 28·00 | 35·00 | 52·0 | S, calm | 0 to 1 | bc.bcm.b. |
| 2 | ·880 | ·814 | ·819 | −20·0 | −25·0 | −22·166 | −42·5 | −46·25 | −43·79 | 44·83 | 47·00 | 50·83 | 48·000 | 28·33 | 35·00 | 52·0 | Calm, S, SE, SSW | 0 to 2 | b.bm.bc. |
| 3 | ·764 | ·770 | ·786 | −23·0 | −26·0 | −24·416 | −45·0 | −47·75 | −46·41 | 47·33 | 51·00 | 51·66 | 46·166 | 31·16 | 36·00 | 54·0 | Calm, ENE, NNW, SE | 0 to 1 | bc.b. |
| 4 | ·750 | ·800 | ·785 | −24·0 | −27·0 | −25·166 | −45·0 | −49·75 | −47·58 | 45·50 | 49·00 | 50·83 | 48·833 | 27·66 | 36·00 | 53·0 | Calm, S, SSE, ENE, E | 0 to 3 | b.bcm. |
| 5 | ·470 | ·600 | ·587 | −17·0 | −25·0 | −21·916 | −38·0 | −44·75 | −40·41 | 45·83 | 48·33 | 52·33 | 48·583 | 29·33 | 35·00 | 53·0 | N, calm, SSE | 0 to 2 | o.coms.os.oms. |
| 6 | ·676 | ·522 | ·550 | −20·0 | −25·0 | −22·125 | −40·5 | −51·75 | −45·54 | 44·83 | 46·16 | 50·66 | 44·833 | 27·00 | 34·00 | 53·0 | SW, SSW, calm, SSE | 0 to 2 | bcm.bc.b.com. |
| 7 | 30·090 | ·850 | ·856 | −25·0 | −37·0 | −30·750 | −50·5 | −55·25 | −52·91 | 42·83 | 43·66 | 49·83 | 44·500 | 24·16 | 35·00 | 50·0 | SSE, SE | 1 to 4 | c.bc.oc. |
| 8 | ·250 | 30·200 | 30·192 | −28·0 | −38·0 | −32·416 | −42·0 | −48·75 | −46·79 | 41·33 | 43·33 | 46·00 | 42·416 | 21·66 | 35·00 | 48·0 | SSE, SE | 1 to 4 | bc.bcm. |
| 9 | 29·910 | ·030 | 29·884 | −28·0 | −35·0 | −31·833 | −43·0 | −55·75 | −48·41 | 40·66 | 43·00 | 50·16 | 41·583 | 23·00 | 34·00 | 49·0 | SE, calm, SSE | 0 to 3 | bc.b. |
| 10 | 30·050 | 29·800 | 30·029 | −29·0 | −32·0 | −30·208 | −49·0 | −55·75 | −51·20 | 41·83 | 44·83 | 50·50 | 41·833 | 25·33 | 34·00 | 49·0 | SSW, SE, calm, ESE | 0 to 3 | bv.b.bm.bc. |
| 11 | 29·990 | 30·020 | ·127 | −27·0 | −36·0 | −31·583 | −44·0 | −54·25 | −50·20 | 46·75 | 44·00 | 48·16 | 44·166 | 22·50 | 35·00 | 47·5 | SE, calm, SW | 0 to 4 | b.bc.bcm.om. |
| 12 | 30·200 | ·126 | ·076 | −21·0 | −30·0 | −25·666 | −36·0 | −47·25 | −41·95 | 39·50 | 42·58 | 51·16 | 47·166 | 25·66 | 35·00 | 50·0 | SW, S, SSW | 1 to 5 | om.bc.com. |
| 13 | 29·930 | ·100 | 29·858 | −16·0 | −23·0 | −19·541 | −33·0 | −36·25 | −33·95 | 41·66 | 44·66 | 49·25 | 43·750 | 27·00 | 35·00 | 51·0 | S | 2 to 7 | omc.omq.om. |
| 14 | ·700 | 29·910 | ·506 | −17·0 | −26·0 | −21·833 | −34·5 | −40·90 | −37·50 | 43·50 | 44·16 | 48·16 | 42·583 | 23·83 | 34·00 | 50·0 | SSW, S, ESE, SE | 1 to 6 | bcmq.bcm.b.bc. |
| 15 | ·550 | ·428 | ·649 | −17·0 | −26·0 | −20·666 | −24·0 | −38·87 | −32·37 | 41·16 | 42·83 | 48·83 | 44·000 | 24·50 | 35·00 | 50·0 | SE, SSE, S | 3 to 8 | bc.bcm.cqom. |
| 16 | ·732 | ·650 | ·769 | −13·0 | −17·0 | −14·250 | −23·0 | −30·87 | −25·87 | 42·50 | 45·66 | 50·16 | 45·000 | 27·33 | 35·00 | 52·0 | SSE | 5 to 7 | coqd.omq.bc. |
| 17 | ·602 | ·826 | ·761 | −14·0 | −25·0 | −20·750 | −29·0 | −37·37 | −33·25 | 42·16 | 44·83 | 48·16 | 44·750 | 25·50 | 35·00 | 47·5 | SSE, N, calm | 0 to 5 | beq.bc.bcmq.bq. |
| 18 | ·170 | ·332 | ·354 | −11·5 | −17·0 | −14·208 | −28·0 | −34·05 | −30·20 | 44·33 | 45·66 | 50·33 | 47·083 | 28·83 | 34·00 | 50·0 | Calm, SW, SE, W | 0 to 1 | bm.om.bcm.com. |
| 19 | ·100 | ·090 | ·183 | −15·0 | −22·0 | −18·916 | −34·0 | −40·37 | −37·33 | 43·33 | 46·16 | 51·66 | 50·333 | 26·66 | 34·00 | 51·0 | S, SW, WSW, WNW, N | 0 to 3 | om.bcm.bm.cm. |
| 20 | ·320 | ·188 | ·194 | −22·0 | −25·0 | −22·500 | −40·0 | −44·00 | −41·45 | 42·50 | 46·33 | 49·33 | 47·000 | 27·83 | 34·00 | 50·0 | W, WSW, calm, S, SW | 0 to 1 | cm.bm.b. |
| 21 | ·420 | ·418 | ·404 | −21·0 | −25·0 | −22·583 | −35·0 | −45·00 | −40·83 | 43·33 | 46·00 | 50·50 | 46·333 | 26·33 | 34·00 | 51·0 | Calm, SE, S | 0 to 1 | bm.b. |
| 22 | ·610 | ·500 | ·597 | −15·0 | −20·0 | −18·333 | −30·0 | −39·25 | −34·87 | 42·83 | 44·66 | 47·66 | 46·166 | 27·33 | 34·00 | 50·0 | SW, calm, S, SW | 0 to 4 | bcm.oms.bm.bc. |
| 23 | ·850 | ·732 | ·738 | −18·0 | −20·0 | −18·958 | −34·0 | −40·50 | −37·41 | 40·66 | 43·16 | 47·50 | 45·083 | 24·66 | 36·00 | 49·0 | S, SW, SE, calm | 0 to 1 | om.bc.b. |
| 24 | 30·174 | ·960 | 30·002 | −18·0 | −22·0 | −20·416 | −36·0 | −45·00 | −40·54 | 40·50 | 44·16 | 50·83 | 46·416 | 25·16 | 35·00 | 51·0 | SSW, S, calm | 0 to 3 | b.bc. |
| 25 | ·160 | 30·350 | ·279 | −20·0 | −24·0 | −22·583 | −39·0 | −46·62 | −41·87 | 39·33 | 42·83 | 49·33 | 47·416 | 23·66 | 34·00 | 51·0 | S, calm, SE, W, SSE, SSW | 0 to 4 | bc.bm. |
| 26 | 29·650 | 29·831 | 29·850 | −21·0 | −25·0 | −22·750 | −37·0 | −43·62 | −40·29 | 39·00 | 43·00 | 49·50 | 47·083 | 24·16 | 33·00 | 49·0 | S, calm, NW | 0 to 1 | b.bm. |
| 27 | ·810 | ·632 | ·687 | −20·0 | −22·0 | −21·000 | −30·5 | −41·00 | −36·91 | 38·50 | 43·00 | 49·00 | 46·583 | 23·83 | 34·00 | 49·0 | SSW, S, calm, SE | 0 to 3 | b.bc. |
| 28 | ·900 | ·900 | ·891 | −13·0 | −20·0 | −16·208 | −20·5 | −32·50 | −26·62 | 40·16 | 43·50 | 47·66 | 47·416 | 26·16 | 34·00 | 49·0 | Calm, SW | 0 to 1 | bc.b.bcm. |
| Max. | 30·250 | 30·350 | ... | −11·5 | ... | ... | −20·5 | ... | ... | ... | ... | ... | ... | ... | 36·00 | 54·0 | | | |
| Min. | 29·100 | 29·090 | ... | ... | −38·0 | ... | ... | −55·75 | ... | ... | ... | ... | ... | ... | 33·00 | 47·5 | | | |
| Mean | 29·763 | 29·755 | 29·751 | ... | ... | −22·627 | ... | ... | −40·24 | 42·52 | 44·98 | 49·44 | ... | 25·98 | 34·46 | 50·0 | | | |

# MARCH, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | | | |
| Mar. 1 | 29·716 | 29·850 | 29·818 | – 8·0 | –14·0 | –10·250 | –18·0 | –29·00 | –23·00 | 40·00 | 45·66 | 49·66 | 48·916 | 29·16 | 35·00 | 51·00 | NW, SW, calm, SE | 0 to 2 | b.c.c.b.oc. |
| 2 | ·770 | ·650 | ·680 | – 8·0 | –13·0 | –10·083 | –16·5 | –34·12 | –24·62 | 42·00 | 47·00 | 51·83 | 50·416 | 27·50 | 34·00 | 51·00 | SSW, calm, S | 0 to 1 | com.bcm.bc. |
| 3 | 30·230 | 30·034 | 30·045 | –20·0 | –22·0 | –20·750 | –28·0 | –36·50 | –31·91 | 41·00 | 45·50 | 49·83 | 50·458 | 25·50 | 34·00 | 50·00 | N, SW, NE, calm, SSW, S | 0 to 2 | bc.b. |
| 4 | ·390 | ·288 | ·306 | –19·0 | –25·0 | –21·333 | –24·0 | –36·37 | –30·00 | 40·00 | 45·16 | 50·83 | 48·416 | 26·66 | 34·00 | 50·00 | Calm, SE | 0 to 5 | bc.bcq. |
| 5 | ·264 | ·362 | ·352 | –18·0 | –22·0 | –20·250 | –25·0 | –38·25 | –31·54 | 41·00 | 46·83 | 53·16 | 52·583 | 26·00 | 34·00 | 49·00 | Calm, SE, ESE, W | 0 to 4 | b.bq.bc.bm. |
| 6 | ·080 | ·170 | ·171 | –20·0 | –25·0 | –22·000 | –31·0 | –44·00 | –38·83 | 39·00 | 44·33 | 49·83 | 48·416 | 32·83 | 34·00 | 49·00 | SE, calm | 0 to 3 | bc.b. |
| 7 | 29·795 | 29·940 | 29·920 | –25·0 | –29·0 | –27·583 | –31·0 | –44·37 | –39·70 | 39·00 | 43·66 | 52·83 | 46·208 | 23·83 | 34·00 | 49·00 | Calm | 0 | b.bm. |
| 8 | ·800 | ·750 | ·767 | –15·0 | –27·0 | –21·083 | –20·0 | –36·00 | –28·41 | 39·50 | 43·16 | 53·50 | 47·916 | 24·16 | 34·00 | 50·00 | Calm | 0 | bc.c. |
| 9 | ·900 | ·844 | ·848 | –17·0 | –24·0 | –21·125 | –19·0 | –38·37 | –30·70 | 39·50 | 44·00 | 55·00 | 48·000 | 25·66 | 35·00 | 50·00 | SE, ESE, E | 1 to 4 | bc.bcm.bm.b. |
| 10 | ·944 | ·930 | ·926 | –20·0 | –25·0 | –22·666 | –30·0 | –42·25 | –35·87 | 40·00 | 44·33 | 55·33 | 46·583 | 25·50 | 34·00 | 51·00 | ENE, calm, NNW, SSE, SE | 0 to 5 | bc.b.c.bq.bm. |
| 11 | ·804 | ·864 | ·866 | –20·0 | –26·0 | –23·541 | –27·0 | –36·00 | –32·41 | 38·00 | 42·33 | 53·16 | 45·916 | 22·00 | 34·00 | 51·00 | Calm, ESE, E | 0 to 7 | bm.bmq.b.bq. |
| 12 | ·732 | ·740 | ·750 | –19·0 | –23·0 | –21·375 | –26·5 | –30·75 | –28·25 | 38·00 | 42·50 | 54·16 | 45·666 | 22·00 | 34·00 | 57·00 | ESE, S | 1 to 5 | cq.bcmq.bm.b. |
| 13 | ·816 | ·808 | ·789 | –17·0 | –25·0 | –21·125 | –23·0 | –44·81 | –35·41 | 40·00 | 44·16 | 52·16 | 49·541 | 24·16 | 34·00 | 50·00 | Calm, SE, SSW, SW | 0 to 3 | bm.bcm.bc.b. |
| 14 | ·618 | ·852 | ·788 | –22·0 | –34·0 | –26·583 | –35·0 | –49·62 | –42·83 | 38·83 | 42·66 | 52·00 | 48·416 | 21·00 | 34·00 | 50·00 | S, SSW, calm, SE, SSE, E | 0 to 3 | c.bm.b.bc. |
| 15 | ·526 | ·524 | ·543 | –21·0 | –31·0 | –26·333 | –23·5 | –40·00 | –34·33 | 37·25 | 40·66 | 50·33 | 46·666 | 20·83 | 34·00 | 50·00 | Calm, E, SSE, SE | 0 to 5 | bc.bm.b.bmq. |
| 16 | ·780 | ·622 | ·655 | –18·0 | –23·0 | –20·666 | –23·0 | –29·62 | –25·66 | 34·66 | 38·50 | 51·00 | 46·500 | 21·66 | 34·00 | 51·00 | ENE, E, SE, SSE | 2 to 6 | c.cm.ocm.oc. |
| 17 | ·930 | ·810 | ·664 | –18·0 | –25·0 | –21·500 | –22·5 | –31·37 | –27·91 | 35·00 | 38·83 | 50·50 | 45·041 | 16·33 | 34·00 | 51·00 | SSE, ESE, SE, calm | 0 to 8 | bom.bcq.bc.q. |
| 18 | ·825 | ·914 | ·887 | –10·0 | –19·0 | –14·250 | –14·0 | –24·25 | –19·41 | 37·00 | 42·41 | 51·83 | 44·208 | 17·33 | 34·00 | 50·00 | SSE, N by W, variable | 2 to 7 | obm.om. |
| 19 | 30·130 | ·804 | ·897 | – 9·0 | –18·0 | –14·000 | –12·5 | –38·37 | –28·22 | 36·66 | 42·00 | 52·00 | 47·625 | 25·33 | 34·00 | 62·00 | NE, NNW, calm, S, SW | 0 to 2 | om.m.cm.c.bc. |
| 20 | 29·950 | 30·244 | 30·154 | –15·0 | –21·0 | –18·666 | –24·0 | –40·12 | –33·25 | 38·66 | 44·16 | 51·16 | 49·291 | 24·16 | 34·00 | 51·00 | Calm, NNW, WSW | 0 to 2 | bc.om.m. |
| 21 | ·600 | 29·610 | 29·672 | –17·0 | –21·5 | –19·083 | –22·5 | –39·37 | –31·41 | 39·16 | 44·50 | 52·66 | 48·416 | 29·66 | 34·00 | 54·00 | WSW, NNW, N, calm, S | 0 to 3 | m.om.bm.obc. |
| 22 | ·900 | ·650 | ·698 | –15·0 | –20·0 | –17·916 | –23·0 | –39·37 | –33·08 | 39·66 | 45·00 | 50·91 | 48·833 | 31·50 | 34·00 | 52·00 | Calm, SE by S, S, SW | 0 to 3 | bm.bc.o. |
| 23 | 30·200 | ·986 | ·999 | –16·0 | –22·0 | –19·541 | –27·5 | –42·25 | –35·41 | 40·33 | 46·83 | 51·00 | 45·166 | 30·83 | 35·00 | 54·00 | NE, SSE, calm, NW | 0 to 3 | obm.om.bm.obc. |
| 24 | ·250 | 30·138 | 30·138 | –17·0 | –21·0 | –19·083 | –21·0 | –37·06 | –30·50 | 38·50 | 44·00 | 52·00 | 44·375 | 32·00 | 35·00 | 51·00 | SSW, calm, NNW, NW | 0 to 4 | om.b.bc.bm. |
| 25 | ·500 | ·384 | ·392 | –19.0 | –24·0 | –21·291 | –22·5 | –43·00 | –34·70 | 39·33 | 45·83 | 52·00 | 43·083 | 29·16 | 33·00 | 52·00 | NW, calm, SSE, S, NW | 0 to 3 | om.b.bc. |
| 26 | ·350 | ·530 | ·473 | –17·0 | –22·0 | –18·333 | –23·0 | –42·00 | –32·20 | 39·33 | 45·80 | 52·00 | 46·208 | 33·16 | 33·00 | 57·00 | SW, S by E, NW | 2 | b.bm. |
| 27 | ·152 | ·232 | ·240 | –16·0 | –26·0 | –21·500 | –22·5 | –46·00 | –36·12 | 39·50 | 46·33 | 53·16 | 45·166 | 31·83 | 34·00 | 51·00 | NW, calm, SSE, S | 0 to 2 | bm.b.bc. |
| 28 | 29·780 | 29·944 | 29·936 | –15·0 | –20·0 | –17·833 | –22·5 | –35·19 | –28·75 | 38·16 | 45·16 | 54·33 | 45·958 | 31·16 | 34·00 | 52·00 | W, NW, NNW, W by N | 1 to 5 | bc.m.drift. |
| 29 | ·250 | ·442 | ·457 | –10·0 | –17·0 | –13·250 | –14·0 | –26·06 | –20·12 | 40·66 | 47·33 | 52·41 | 47·833 | 34·66 | 34·00 | 52·00 | WSW, SW, S | 2 to 3 | m.oms.om. |
| 30 | ·430 | ·234 | ·286 | – 6·0 | –15·0 | –11·500 | –13·0 | –26·00 | –19·91 | 41·66 | 49·66 | 55·66 | 46·916 | 35·50 | 34·00 | 53·00 | SSW, SE, SSE | 1 to 6 | om.m.bc. |
| 31 | ·500 | ·562 | ·537 | –10·0 | –18·0 | –15·041 | –14·0 | –29·68 | –22·33 | 40·00 | 46·83 | 52·83 | 45·958 | 30·86 | 34·00 | 53·00 | SSE, E, SE | 3 to 6 | m.bc.o.oc.bcm. |
| Max. | 30·500 | 30·530 | ... | – 6·0 | ... | ... | –12·5 | | | | | | | | | | | | |
| Min. | 29·250 | 29·234 | ... | ... | –34·0 | ... | ... | –49·62 | | | | | | | | | | | |
| Mean | 29·900 | 29·926 | 29·892 | ... | ... | –19·969 | ... | ... | –30·86 | 39·15 | 44·39 | 52·23 | 47·216 | 26·43 | 34·06 | 51·74 | | | |

# APRIL, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | | | |
| April 1 | 29·680 | 29·518 | 29·550 | −14·0 | −25·0 | −20·125 | −18·5 | −34·31 | −26·70 | 37·83 | 45·16 | 53·33 | 44·750 | 29·83 | 33·00 | 51·00 | ESE, N, SE, SSE | 2 to 5 | b m. b. |
| 2 | ·764 | ·760 | ·753 | −12·0 | −20·5 | −17·458 | −12·0 | −28·37 | −22·33 | 37·50 | 43·50 | 51·83 | 43·541 | 28·50 | 34·00 | 58·00 | SE by S, SE | 3 to 6 | b. b c q. o c q. b q. |
| 3 | ·630 | ·650 | ·659 | −11·0 | −18·0 | −14·083 | − 6·0 | −37·50 | −24·45 | 41·66 | 48·66 | 52·83 | 46·500 | 33·00 | 34·00 | 53·00 | SSE, N, calm, S, SSW | 0 to 4 | b. b c. m. |
| 4 | ·700 | ·684 | ·677 | −11·0 | −16·0 | −13·625 | −10·5 | −36·18 | −25·75 | 43·00 | 49·00 | 54·83 | 46·041 | 34·66 | 34·00 | 55·00 | SW, calm, SE, S | 0 to 5 | b. bc. |
| 5 | ·540 | ·600 | ·611 | − 7·0 | −13·0 | −11·250 | −11·5 | −23·18 | −19·37 | 41·16 | 46·33 | 55·66 | 44·627 | 33·16 | 34·00 | 52·00 | SSW, S | 5 to 7 | o m. o. b c. |
| 6 | ·816 | ·610 | ·648 | − 2·0 | − 6·0 | − 4·458 | −10·0 | −17·00 | −12·91 | 40·50 | 46·00 | 56·66 | 47·166 | 33·16 | 34·00 | 53·00 | WSW, SW, S | 3 to 5 | bc. o m. |
| 7 | 30·150 | 30·012 | 30·012 | Zero | −15·0 | −10·500 | − 8·5 | −27·97 | −20·25 | 42·50 | 49·16 | 57·50 | 49·708 | 35·66 | 35·00 | 53·00 | Calm, SSE, ENE, SE | 0 to 6 | b c. o. b. b m. |
| 8 | ·280 | ·224 | ·238 | −10·5 | −16·0 | −13·458 | −15·0 | −35·12 | −25·70 | 42·16 | 48·50 | 57·16 | 49·625 | 34·83 | 35·00 | 50·00 | SE, ENE. NW, W, calm | 0 to 5 | bc. b. |
| 9 | ·300 | ·330 | ·306 | − 5·0 | −11·0 | − 9·000 | −12·5 | −29·50 | −21·50 | 42·50 | 49·66 | 58·33 | 50·750 | 35·66 | 35·00 | 54·00 | Calm, SE, S by E, S | 0 to 1 | b. bc. b c m. |
| 10 | ·400 | ·340 | ·342 | 3·0 | − 3·5 | − 2·291 | − 1·0 | −16·25 | −12·00 | 44·66 | 52·33 | 58·16 | 51·875 | 37·83 | 35·00 | 56·00 | Calm, WSW | 0 to 2 | b. o. b c. o m. |
| 11 | ·274 | ·420 | ·384 | 4·0 | − 2·0 | 0·583 | − 1·5 | −21·37 | −12·25 | 48·00 | 53·83 | 58·50 | 50·833 | 39·16 | 37·00 | 59·00 | SE, calm, S, S by W, W | 0 to 3 | b c. o m. m. |
| 12 | ·120 | ·150 | ·167 | 4·0 | − 1·5 | 1·500 | − 6·5 | −18·12 | −12·33 | 49·33 | 55·33 | 59·50 | 49·583 | 41·16 | 36·00 | 60·00 | W, NNW, S, NW, SSW | 1 to 4 | o m. o. |
| 13 | 29·738 | 29·850 | 29·872 | 7·0 | 3·0 | 5·416 | 2·0 | −10·00 | − 1·79 | 46·33 | 51·83 | 60·00 | 53·000 | 39·16 | 39·00 | 59·00 | SSW, S, SSE, S by E | 1 to 8 | oc. o m. o. drift. |
| 14 | 30·050 | ·812 | ·853 | 9·0 | 5·0 | 7·333 | 3·5 | − 1·75 | 1·20 | 47·83 | 54·00 | 59·16 | 52·916 | 37·00 | 39·00 | 61·00 | SSE, S, S by E, SSW, NW | 3 to 9 | o m. o q. o q m. b c. |
| 15 | ·302 | 30·300 | 30·268 | 8·0 | 1·0 | 4·333 | − 1·0 | −18·25 | −10·12 | 48·00 | 53·50 | 58·83 | 54·500 | 38·00 | 39·00 | 60·00 | Calm, W, WSW, SSW, S | 0 to 6 | b c. b. drift. |
| 16 | ·250 | ·234 | ·246 | 9·0 | 2·5 | 4·958 | 4·0 | − 4·00 | − 0·91 | 47·66 | 54·33 | 59·16 | 53·916 | 38·66 | 39·00 | 62·00 | S, SW | 4 to 7 | b c. b. o. drift. |
| 17 | ·214 | ·250 | ·215 | 15·0 | 10·0 | 12·166 | 7·2 | − 7·00 | 2·80 | 48·00 | 53·33 | 58·83 | 55·083 | 38·83 | 39·00 | 60·00 | S, SSE, SE | 1 to 5 | o. o q. b c. |
| 18 | ·238 | ·204 | ·207 | 16·0 | 12·0 | 14·791 | 12·5 | 5·00 | 8·66 | 49·75 | 56·33 | 61·83 | 55·500 | 41·66 | 40·00 | 62·00 | SE, calm, NE | 0 to 4 | o. b. o s. o c. b c. |
| 19 | ·330 | ·260 | ·278 | 8·0 | − 2·0 | 2·958 | 4·5 | −11·00 | − 3·41 | 47·00 | 51·33 | 60·66 | 53·125 | 42·00 | 39·00 | 56·00 | NE, N by E, SE, E | 2 to 5 | b c. b c m. o m q. o m. |
| 20 | ·350 | ·330 | ·332 | 13·0 | 2·0 | 7·250 | 12·0 | − 6·50 | 0·77 | 45·83 | 49·16 | 57·91 | 54·666 | 38·16 | 40·00 | 55·00 | Calm, SE, E by N, E | 0 to 5 | b. b c. b v. |
| 21 | ·236 | ·340 | ·300 | 15·0 | 7·0 | 10·583 | 13·0 | − 9·50 | 1·43 | 47·00 | 51·83 | 58·08 | 56·666 | 37·66 | 39·50 | 54·00 | Calm, SE, E, S | 0 to 3 | b. b c. |
| 22 | ·050 | ·144 | ·124 | 22·0 | 12·0 | 16·833 | 15·0 | 6·50 | 9·75 | 47·66 | 52·00 | 60·50 | 56·250 | 37·50 | 39·00 | 57·00 | Calm, E | 0 to 1 | bc. o m s. o s. |
| 23 | ·050 | 29·988 | 29·995 | 22·0 | 15·0 | 18·666 | 15·0 | 2·00 | 7·79 | 49·00 | 53·66 | 62·16 | 55·833 | 38·66 | 39·00 | 56·00 | Calm, SE, E, S, NNE | 0 to 2 | o m s. b. b c. o. h. m. |
| 24 | ·128 | 30·100 | 30·097 | 20·0 | 7·0 | 12·875 | 16·0 | −12·00 | 0·37 | 46·16 | 50·83 | 58·50 | 54·916 | 35·33 | 40·00 | 55·00 | NNE, calm, E by S, SSE | 0 to 2 | b c. |
| 25 | ·174 | ·172 | ·170 | 22·0 | 7·0 | 12·000 | 15·0 | − 6·00 | 2·91 | 42·50 | 46·50 | 61·66 | 56·750 | Ceased registry. | 40·00 | 49·00 | Calm, E, ESE, SE, SSE | 0 to 2 | b c. b. |
| 26 | ·252 | ·164 | ·188 | 19·0 | − 5·5 | 5·875 | 14·5 | − 8·50 | 3·66 | 38·66 | 42·75 | 58·83 | 52·958 | | 39·00 | 49·00 | SSE, calm | 0 to 2 | b c. |
| 27 | ·240 | ·075 | ·224 | 16·0 | 6·0 | 10·250 | 16·0 | 3·00 | 9·45 | 39·50 | 43·83 | 58·16 | 51·333 | | 39·00 | 49·00 | Calm, SSE, SE | 0 to 5 | b. b c. o. |
| 28 | ·020 | ·000 | ·002 | 30·0 | 16·0 | 18·041 | 21·0 | 15·00 | 17·87 | 39·16 | 44·58 | 58·16 | 51·916 | | 39·50 | 48·00 | SE | 2 to 5 | o c. b c. o m. |
| 29 | 29·932 | ·000 | 29·975 | 22·0 | 18·0 | 19·541 | 23·0 | 16·50 | 19·66 | 38·83 | 43·83 | 58·83 | 56·333 | | 39·50 | 48·50 | SE, calm | 0 to 3 | o c. m. s. |
| 30 | 30·108 | ·000 | 30·009 | 21·0 | − 1·0 | 11·250 | 20·0 | − 3·50 | 9·50 | 41·66 | 44·83 | 57·00 | 55·500 | | 39·50 | 51·00 | SE, S, calm | 0 to 2 | o s. b c m. f. |
| Max. | 30·400 | 30·420 | ... | 22·0 | ... | ... | 23·0 | | | | | | | | | | | | |
| Min. | 29·540 | 29·518 | ... | ... | −25·0 | ... | ... | −37·50 | | | | | | | | | | | |
| Mean | 30·071 | 30·054 | 30·057 | ... | ... | 2·365 | ... | ... | 4·84 | 44·08 | 49·86 | 56·41 | 51·838 | 36·22 | 37·45 | 54·88 | | | |

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | Direction. | Force. | |
| May 1 | 30·108 | 30·128 | 30·110 | 13·5 | −8·0 | 2·31 | Zero | −13·00 | −7·00 | 36·0 | 42·0 | 57·5 | 55·00 | ... | 39·5 | 44·0 | Calm | 0 | o.b.o.b.e.m.m.o. |
| 2 | ·112 | ·103 | ·040 | 12·0 | −5·0 | −0·42 | Zero | −13·00 | −7·60 | 37·0 | 41·8 | 55·7 | 55·37 | ... | 38·0 | 47·0 | SE, S, NW | 1 | b.e.b. |
| 3 | 29·930 | 29·950 | 29·927 | 13·0 | −1·0 | 4·92 | 6·00 | −12·50 | −1·71 | 35·5 | 39·3 | 55·2 | 52·20 | ... | 38·5 | 42·0 | N, calm, NW | 1 to 3 | o.b.e.b. |
| 4 | ·916 | ·750 | ·724 | 15·0 | −1·0 | 8·04 | 12·00 | − 9·50 | 2·11 | 39·8 | 44·5 | 58·3 | 50·00 | ... | 39·0 | 50·0 | Calm, NW, SE, NW, W | 1 to 3 | b.b.e.b.e.m. |
| 5 | ·560 | ·516 | ·537 | 13·0 | 3·0 | 7·92 | 15·00 | − 3·00 | 4·54 | 41·5 | 45·0 | 60·0 | 51·33 | ... | 36·0 | 51·0 | SW, NW | 2 to 5 | o.o.m.o.s. |
| 6 | ·584 | ·684 | ·722 | 10·5 | −9·5 | 0·08 | 8·00 | −19·00 | −5·23 | 40·1 | 43·7 | 57·0 | 51·50 | ... | 35·0 | 49·0 | NW, WSW, SSE | 1 to 2 | o.s.o.b.c. |
| 7 | ·900 | 30·000 | 30·016 | 8·0 | −6·0 | 2·04 | 4·00 | −15·00 | −4·87 | 40·2 | 46·0 | 56·2 | 50·06 | ... | 34·0 | 49·0 | NW, W, SW | 1 to 2 | b.b.h.o.m. |
| 8 | 30·150 | ·240 | ·242 | 9·0 | Zero | 3·75 | 8·50 | − 2·50 | 1·79 | 37·6 | 41·0 | 55·2 | 51·30 | ... | 34·0 | 50·0 | SW, SE, ESE | 2 to 5 | o.m.o.c. |
| 9 | ·250 | ·220 | ·203 | 11·0 | 4·0 | 6·83 | 12·00 | 1·00 | 5·00 | 36·8 | 41·3 | 54·8 | 51·17 | ... | 34·0 | 50·0 | E, ESE, SE | 2 to 6 | o.c.o.b.m. |
| 10 | ·175 | 29·980 | ·067 | 17·0 | 7·0 | 10·12 | 15·00 | 1·00 | 6·16 | 40·6 | 43·0 | 56·3 | 49·53 | ... | 34·0 | 49·0 | Calm, N | 0 to 4 | b.c.b.c.o.m. |
| 11 | ·014 | ·890 | 29·885 | 11·0 | 5·0 | 8·29 | 13·00 | 2·00 | 6·50 | 38·1 | 40·5 | 56·0 | 48·00 | ... | 34·0 | 47·0 | NW | 2 to 4 | o.m.o.s.o.m.s. |
| 12 | 29·724 | ·670 | ·714 | 11·0 | 4·0 | 7·42 | 15·00 | − 3·00 | 4·96 | 40·6 | 41·7 | 52·0 | 48·33 | ... | 34·0 | 49·0 | SW, WNW, N | 0 to 4 | o.s.b.c. |
| 13 | ·818 | ·970 | ·976 | 16·0 | 1·0 | 7·54 | 12·50 | −11·00 | 1·20 | 36·1 | 40·1 | 55·0 | 47·42 | ... | 34·0 | 48·0 | N, NE, S | 0 to 2 | b.c.c. |
| 14 | 30·050 | 30·200 | 30·036 | 18·0 | 7·0 | 11·00 | 10·00 | Zero | 5·33 | 36·6 | 42·0 | 54·0 | 47·50 | ... | 34·5 | 46·0 | NW, SW, NNW | 1 to 3 | b.c.o.m.o.c. |
| 15 | ·000 | 29·988 | 29·963 | 17·0 | 1·0 | 8·58 | 16·50 | − 7·00 | 4·37 | 38·0 | 41·6 | 55·6 | 47·20 | ... | 33·0 | 47·0 | Calm, W, S | 0 to 2 | b.c.o.s. |
| 16 | 29·916 | ·938 | ·961 | 17·5 | 3·0 | 12·21 | 16·50 | − 3·00 | 7·92 | 36·3 | 39·1 | 52·2 | 47·17 | ... | 33·5 | 43·0 | WNW, calm, N | 0 to 5 | b.c.o.c.o. |
| 17 | 30·040 | 30·050 | 30·035 | 20·0 | 13·0 | 15·58 | 20·00 | 5·00 | 13·75 | 35·2 | 39·5 | 55·0 | 47·50 | ... | 34·0 | 47·0 | NE, ESE | 0 to 4 | o.b.c. |
| 18 | ·060 | ·104 | ·114 | 24·0 | 2·0 | 11·21 | 20·00 | − 2·50 | 8·82 | 35·2 | .... | 55·0 | 48·42 | ... | 34·0 | 47·0 | S, calm, W | 0 to 1 | b.c.b.m.o. |
| 19 | ·170 | ·170 | ·183 | 16·0 | 4·0 | 8·58 | 17·00 | Zero | 7·79 | 37·0 | ... | 53·2 | 49·42 | ... | 34·0 | 47·0 | SW, W | 1 to 4 | o.b.c.c.o. |
| 20 | ·250 | ·266 | ·261 | 14·0 | 7·0 | 10·46 | 18·50 | 5·00 | 10·25 | ... | ... | 45·6 | 45·50 | ... | 33·0 | 42·0 | NE, E, W | 0 to 2 | c.o.b.c.o. |
| 21 | ·260 | ·280 | ·284 | 20·0 | 12·0 | 13·75 | 18·00 | 9·00 | 12·87 | ... | ... | 46·8 | 46·00 | ... | 33·0 | 41·0 | Calm, S, SE | 0 to 3 | o.c.b.c. |
| 22 | ·306 | ·314 | ·289 | 21·5 | 5·5 | 12·58 | 17·50 | 4·00 | 11·29 | ... | ... | 45·2 | 44·06 | ... | 33·0 | 43·0 | SE, SSE | 3 to 5 | b.c. |
| 23 | ·214 | ·124 | ·131 | 20·0 | 4·5 | 11·92 | 19·00 | Zero | 18·83 | 29·6 | 30·3 | 51·5 | 44·43 | ... | 33·0 | 36·0 | NE, E, calm | 0 to 5 | b.c.b. |
| 24 | ·100 | ·030 | ·022 | 24·5 | 8·0 | 17·54 | 28·50 | 6·00 | 16·04 | 28·3 | 30·0 | 51·1 | 48·33 | ... | 33·0 | 33·0 | NNE, SE, calm | 0 to 5 | b.b.c. |
| 25 | 29·930 | 29·830 | 29·849 | 31·5 | 19·0 | 25·25 | 30·00 | 15·00 | 21·45 | 33·2 | 35·3 | 56·0 | 47·50 | ... | 34·0 | 35·0 | Calm, SE | 0 to 1 | o.o.c.s. |
| 26 | ·800 | ·846 | ·872 | 35·0 | 19·0 | 25·54 | 33·50 | 16·00 | 25·58 | 35·5 | 37·2 | 54·0 | 49·02 | ... | 36·0 | 37·0 | Calm, SW, NW | 0 to 2 | o.s.o.m.o.m.s. |
| 27 | 30·000 | 30·108 | 30·127 | 28·0 | 14·0 | 21·29 | 28·50 | 10·00 | 18·71 | 36·6 | 38·2 | 55·3 | 51·50 | ... | 37·5 | 39·0 | Calm, W, NNW | 0 to 1 | m.b.c. |
| 28 | ·220 | ·234 | ·222 | 32·0 | 12·5 | 20·83 | 24·00 | 9·00 | 20·37 | 35·6 | 36·6 | 54·6 | 49·70 | ... | 37·0 | 40·0 | SW, calm, SW | 0 to 5 | b.c.o.s. |
| 29 | ·170 | ·160 | ·175 | 26·0 | 20·0 | 23·92 | 24·00 | 17·00 | 22·46 | 35·5 | 37·5 | 55·5 | 48·50 | ... | 38·0 | 37·0 | S, SSW, S | 2 to 8 | o.m.q.o.q.o.q.s. |
| 30 | ·230 | ·238 | ·256 | 30·0 | 22·0 | 26·21 | 32·09 | 19·37 | 26·37 | 37·1 | 39·3 | 55·6 | 49·33 | ... | 35·0 | 39·0 | Calm, E, NE | 0 to 4 | o.o.c. |
| 31 | ·320 | ·250 | ·220 | 32·0 | 20·0 | 27·42 | 33·00 | 19·00 | 26·92 | 39·0 | 40·2 | 51·5 | 49·50 | ... | 38·0 | 34·0 | E, SE, SW | 0 to 4 | o.b.e.v.b.c. |
| Max. | 30·320 | 30·314 | ... | 35·0 | ... | ... | 33·00 | | | | | | | | | | | | |
| Min. | 29·560 | 29·516 | ... | ... | −9·5 | ... | ... | −19·00 | | | | | | | | | | | |
| Mean | 30·041 | 30·040 | 30·041 | ... | ... | 8·78 | ... | ... | 9·34 | 36·8 | 39·8 | 54·1 | 48·98 | ... | 35·0 | 43·7 | | | |

# JUNE, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | | | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | Direction. | Force. | |
| June 1 | 30·050 | 29·938 | 29·932 | 35·0 | 23·5 | 27·75 | 33·0 | 20·00 | 26·96 | 37·5 | 40·6 | 50·5 | 52·00 | ... | 39·0 | 38·0 | SW, calm, SSW | 0 to 5 | bc.oq.o. |
| 2 | 29·854 | ·800 | ·793 | 35·0 | 28·0 | 30·58 | 40·5 | 25·00 | 29·37 | 40·3 | 43·3 | 49·3 | 51·75 | ... | 38·5 | 41·0 | S, calm, E | 0 to 5 | oms.omqs.oms. |
| 3 | ·790 | ·950 | ·955 | 35·0 | 24·0 | 29·92 | 34·0 | 19·00 | 26·42 | 44·3 | 43·8 | 52·2 | 49·33 | ... | 40·0 | 42·0 | E, N, S | 1 to 7 | oq.bcq.bcr. |
| 4 | 30·120 | 30·142 | 30·132 | 36·0 | 23·0 | 29·66 | 32·5 | 17·00 | 25·00 | 46·8 | 47·6 | 53·5 | 48·50 | ... | 40·0 | 42·0 | WNW, NNW, calm | 0 to 3 | bc. |
| 5 | ·110 | ·072 | ·072 | 31·0 | 20·0 | 26·08 | 26·0 | 15·00 | 20·25 | 39·0 | 40·6 | 46·5 | 46·33 | ... | 38·0 | 40·0 | NNW, calm, NNW | 0 to 3 | bc.b.bc. |
| 6 | ·060 | 29·938 | 29·926 | 32·0 | 16·0 | 25·33 | 27·5 | 15·00 | 21·12 | 36·3 | 38·1 | 53·5 | 47·08 | ... | 38·5 | 42·0 | NW, calm, SW | 0 to 2 | bc. |
| 7 | 29·808 | ·660 | ·684 | 34·0 | 22·0 | 27·08 | 28·0 | 20·00 | 23·54 | 36·9 | 39·5 | 47·0 | 50·66 | ... | 39·0 | 41·0 | N, NNE, ESE, N | 1 to 6 | oc.omq.bc. |
| 8 | ·680 | ·800 | ·794 | 34·0 | 18·0 | 26·66 | 32·5 | 18·25 | 23·25 | 39·1 | 42·1 | 45·6 | 48·42 | ... | 38·0 | 41·0 | NNW, calm, SE | 0 to 1 | bcm.om.bc. |
| 9 | ·870 | ·776 | ·783 | 35·0 | 26·0 | 29·42 | 33·5 | 23·00 | 27·12 | 37·5 | 40·1 | 45·8 | 48·42 | ... | 38·5 | 42·0 | SSE, SE | 2 to 7 | o.cqs.omqs. |
| 10 | ·554 | ·480 | ·511 | 32·0 | 27·0 | 30·08 | 31·0 | 25·00 | 28·58 | 41·5 | 45·1 | 49·1 | 48·83 | ... | 39·0 | 43·0 | E, NNE | 4 to 6 | cqs.bcm.cos. |
| 11 | ·630 | ·750 | ·762 | 30·0 | 24·0 | 27·25 | 27·5 | 21·00 | 24·42 | 41·0 | 43·6 | 44·6 | 50·42 | ... | 39·0 | 42·0 | N, NNW, NW | 2 to 5 | omq.om.oc. |
| 12 | ·850 | ·880 | ·882 | 29·0 | 25·0 | 27·16 | 27·0 | 23·00 | 24·96 | 43·0 | 45·0 | 44·6 | 52·33 | ... | 39·5 | 43·0 | NNW, NW, NNW | 4 to 6 | ocq.omq. |
| 13 | ·910 | ·908 | ·913 | 27·0 | 20·0 | 24·66 | 26·5 | 18·50 | 23·29 | 40·8 | 44·5 | 47·1 | 50·66 | ... | 39·0 | 43·0 | Calm, NNW, calm | 0 to 6 | bc.cm. |
| 14 | ·860 | ·800 | ·819 | 34·0 | 23·0 | 25·92 | 28·0 | 20·50 | 23·00 | 44·5 | 47·1 | 51·5 | 49·50 | ... | 38·5 | 41·0 | NNW, NW | 3 to 4 | bc.oc.cm. |
| 15 | ·800 | ·820 | ·817 | 31·0 | 25·0 | 27·83 | 29·0 | 22·00 | 27·33 | 44·0 | 46·3 | 46·7 | 49·17 | ... | 38·5 | 41·0 | NW, calm | 0 to 3 | ocm.ocq.o. |
| 16 | ·826 | ·820 | ·794 | 35·0 | 23·0 | 28·66 | 36·0 | 21·00 | 26·62 | 44·0 | 44·5 | 47·7 | 50·25 | ... | 38·0 | 41·0 | NNW, calm, WNW | 0 to 2 | oc.bc. |
| 17 | ·750 | ·750 | ·771 | 33·0 | 24·0 | 29·00 | 35·0 | 21·00 | 27·04 | 44·1 | 46·7 | 46·3 | 50·25 | ... | 39·0 | 43·0 | Calm, NW | 0 to 3 | oc.bc.oc. |
| 18 | ·828 | ·880 | ·872 | 32·0 | 25·0 | 28·66 | 38·0 | 24·00 | 28·75 | 46·5 | 47·7 | 48·2 | 50·33 | ... | 39·5 | 43·0 | NNE, calm, SE | 0 to 2 | o.bc.o. |
| 19 | ·894 | ·900 | ·910 | 35·0 | 25·0 | 28·75 | 37·0 | 23·00 | 28·12 | 45·1 | 46·8 | 50·0 | 48·08 | ... | 39·5 | 44·0 | E, SE, calm, NE | 0 to 6 | bcm.bc.oq. |
| 20 | ·950 | ·934 | ·931 | 32·0 | 24·0 | 27·92 | 31·0 | 23·00 | 26·25 | 45·1 | 46·8 | 47·5 | 51·50 | ... | 40·5 | 43·0 | NE, N | 3 to 7 | oc.bcq.cq. |
| 21 | ·920 | ·950 | ·962 | 31·0 | 25·0 | 27·83 | 34·0 | 23·00 | 25·79 | 43·8 | 45·1 | 47·7 | 52·00 | ... | 41·0 | 42·5 | NNW, SE, NNW | 1 to 4 | oq.bcq.o. |
| 22 | 30·104 | 30·100 | 30·064 | 38·0 | 28·0 | 33·17 | 42·0 | 25·00 | 32·25 | 42·7 | 44·6 | 49·5 | 53·42 | ... | 42·0 | 42·0 | SSW, S, calm | 0 to 3 | bc.of.bc. |
| 23 | ·000 | 29·966 | 29·965 | 39·0 | 30·0 | 35·50 | 44·0 | 25·00 | 35·46 | 44·1 | 45·1 | 48·3 | 54·33 | ... | 43·0 | 43·0 | N, calm, E, calm | 0 to 2 | o.bc.o. |
| 24 | 29·910 | ·742 | ·761 | 38·0 | 31·0 | 35·01 | 38·0 | 25·00 | 32·00 | 44·1 | 44·5 | 49·0 | 53·50 | ... | 44·0 | 44·0 | NW, E, ENE | 1 to 7 | oc.bc.bcq. |
| 25 | ·678 | ·650 | ·677 | 37·0 | 29·0 | 33·50 | 37·0 | 26·00 | 31·21 | 43·6 | 44·3 | 47·0 | 52·42 | ... | 44·0 | 43·5 | E, ESE, SE | 7 to 10 | cq.omqs.bcq. |
| 26 | ·784 | ·808 | ·780 | 44·0 | 34·0 | 37·12 | 44·0 | 29·00 | 33·83 | 44·3 | 46·3 | 47·3 | 54·42 | ... | 44·0 | 44·0 | Calm, SE, calm | 0 to 7 | bcq.o.bc. |
| 27 | ·722 | ·660 | ·662 | 40·0 | 34·0 | 36·75 | 42·0 | 31·00 | 34·25 | 44·0 | 46·1 | 44·5 | 53·66 | ... | 42·0 | 42·0 | N, E, SE | 1 to 4 | bc.o.bcq. |
| 28 | ·642 | ·562 | ·569 | 38·0 | 33·0 | 35·17 | 38·0 | 28·00 | 32·25 | 44·6 | 47·1 | 44·3 | 53·50 | ... | 43·0 | 42·0 | SSE, E, ESE | 2 to 7 | cqo.og.oms. |
| 29 | ·522 | ·580 | ·592 | 39·0 | 32·0 | 36·25 | 42·0 | 32·00 | 36·42 | 46·1 | 46·0 | 49·0 | 52·66 | ... | 42·5 | ... | SE, E, SE | 1 to 8 | oc.bcq. |
| 30 | ·664 | ·586 | ·578 | 39·0 | 34·0 | 36·50 | 36·0 | 31·00 | 33·33 | 46·0 | 47·1 | 48·7 | 51·50 | ... | 42·5 | ... | E, ESE | 4 to 10 | bcq.ocqr.ocq. |
| Max. | 30·120 | 30·142 | ... | 44·0 | ... | ... | 44·0 | | | | | | | | | | | | |
| Min. | 29·522 | 29·480 | ... | ... | 16·0 | ... | ... | 15·00 | | | | | | | | | | | |
| Mean | 29·838 | 29·820 | 29·824 | ... | ... | 30·17 | ... | ... | 27·91 | 42·7 | 44·5 | 48·1 | 50·87 | ... | 40·2 | 42·1 | | | |

# JULY, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | | | |
| July 1 | 29·550 | 29·756 | 29·737 | 42·0 | 37·0 | 38·42 | 39·0 | 32·0 | 35·5 | 47·1 | 46·5 | 49·1 | 51·66 | ... | 44·0 | ... | ESE, S, SE by S | 2 to 8 | oq. bcq. |
| 2 | ·814 | ·730 | ·708 | 42·0 | 34·0 | 37·17 | Withdrawn. | | | 48·1 | 54·1 | 52·3 | 49·92 | ... | 44·5 | ... | SE, ES, WSW | 3 to 8 | ocq. bcq. |
| 3 | ·620 | ·530 | ·547 | 38·0 | 33·0 | 36·21 | ... | ... | ... | 55·8 | 57·1 | 57·8 | 51·25 | ... | 45·0 | ... | Calm, E, SE | 0 to 9 | oc. omqs. oc. |
| 4 | ·534 | ·600 | ·608 | 40·0 | 35·0 | 36·96 | ... | ... | ... | 54·6 | 55·1 | 57·5 | 51·25 | ... | 45·0 | ... | Calm, SE, ESE | 0 to 7 | o. bcq. com. |
| 5 | ·680 | ·700 | ·703 | 43·0 | 37·0 | 38·83 | ... | ... | ... | 56·1 | 56·1 | 55·7 | 51·82 | ... | 45·0 | ... | SE, NE, ENE | 3 to 6 | oc. ocq. com. |
| 6 | ·720 | ·766 | ·785 | 43·0 | 37·0 | 40·25 | ... | ... | ... | 55·5 | 56·5 | 57·0 | 53·00 | ... | 46·0 | ... | ENE, calm, W | 0 to 4 | oc. coq. omp. |
| 7 | ·870 | ·900 | ·874 | 43·0 | 33·0 | 36·58 | ... | ... | ... | 53·5 | 55·5 | 57·6 | 52·08 | ... | 46·0 | ... | Calm, W, calm | 0 to 1 | oc. om. oms. |
| 8 | ·850 | ·860 | ·857 | 37·0 | 32·0 | 34·67 | ... | ... | ... | 52·1 | 53·5 | 56·6 | 53·00 | ... | 45·0 | ... | NW, W, calm | 0 to 2 | oms. com. |
| 9 | ·860 | ·830 | ·836 | 37·0 | 33·0 | 34·58 | ... | ... | ... | 51·6 | 53·0 | 57·8 | 51·08 | ... | 45·0 | ... | WNW, calm, NW | 0 to 1 | om. com. om. |
| 10 | ·832 | ·800 | ·784 | 41·0 | 35·0 | 37·58 | ... | ... | ... | 52·1 | 54·8 | 51·3 | 49·75 | ... | 45·0 | ... | Calm, N, NE | 0 to 1 | of. oc. od. |
| 11 | ·722 | ·620 | ·645 | 41·0 | 33·0 | 37·67 | ... | ... | ... | 49·8 | 51·8 | 51·0 | 51·00 | ... | 45·0 | ... | NE, calm | 0 to 1 | bc. oc. |
| 12 | ·600 | ·536 | ·528 | 41·0 | 37·0 | 37·96 | ... | ... | ... | 49·6 | 51·3 | 50·6 | 49·83 | ... | 45·0 | ... | W, SSW, ESE | 1 to 8 | bc. oqr. omcq. |
| 13 | ·450 | ·490 | ·498 | 42·0 | 35·0 | 36·67 | ... | ... | ... | 47·5 | 49·1 | 49·8 | 46·75 | ... | 44·0 | ... | E, SE, E | 3 to 7 | oqr. or. bcq. |
| 14 | ·580 | ·700 | ·691 | 40·0 | 36·0 | 37·29 | ... | ... | ... | 47·3 | 49·3 | 53·0 | 42·17 | ... | 44·0 | ... | ENE, E | 3 to 8 | oq. omq. om. |
| 15 | ·750 | ·614 | ·592 | 37·0 | 32·0 | 34·96 | ... | ... | ... | 46·5 | 47·5 | 57·5 | 41·75 | ... | 44·0 | ... | W, S, SSW | 1 to 5 | omd. od. ocq. |
| 16 | ·430 | ·365 | ·372 | 41·0 | 36·0 | 37·42 | ... | ... | ... | 46·5 | 48·0 | 55·3 | 43·25 | ... | 44·5 | ... | SSE, E, ESE | 5 to 8 | cmq. ocq. ocqm. |
| 17 | ·350 | ·370 | ·387 | 42·0 | 35·0 | 37·50 | ... | ... | ... | 48·8 | 52·1 | 53·6 | 41·83 | ... | 45·0 | ... | E | 3 to 7 | ocq. oc. |
| 18 | ·400 | ·480 | ·487 | 43·0 | 35·0 | 39·08 | ... | ... | ... | 49·3 | 52·3 | 56·8 | 43·17 | ... | 45·0 | ... | NE | 2 to 3 | oed. oc. os. |
| 19 | ·550 | ·682 | ·691 | 44·0 | 35·0 | 40·08 | ... | ... | ... | 50·3 | 54·1 | 55·5 | 43·66 | ... | 44·0 | ... | E | 2 to 4 | bc. |
| 20 | ·780 | ·900 | ·876 | 48·0 | 35·0 | 39·67 | ... | ... | ... | 50·1 | 53·0 | 55·7 | 42·00 | ... | 44·0 | ... | SE by E, E | 2 to 5 | bc. |
| 21 | ·856 | ·816 | ·805 | 44·0 | 40·0 | 41·67 | ... | ... | ... | 52·8 | 54·3 | 56·3 | 41·42 | ... | 44·0 | ... | E, N | 2 to 5 | bc. |
| 22 | ·730 | ·666 | ·669 | 44·0 | 38·0 | 40·67 | ... | ... | ... | 51·5 | 53·5 | 53·7 | 43·10 | ... | 43·0 | ... | NE | 1 to 5 | oq. |
| 23 | ·652 | ·690 | ·703 | 44·0 | 36·0 | 40·33 | ... | ... | ... | 51·2 | 52·8 | 57·3 | 42·16 | ... | 45·0 | ... | NE | 3 to 5 | obcq. bc. |
| 24 | ·738 | ·750 | ·748 | 42·0 | 36·5 | 38·87 | ... | ... | ... | 52·0 | 53·7 | 54·8 | 42·08 | ... | 45·0 | ... | Calm, N | 0 to 1 | obc. ov. obc. |
| 25 | ·758 | ·788 | ·753 | 46·0 | 35·0 | 37·71 | ... | ... | ... | 54·7 | 55·5 | 54·5 | 40·25 | ... | 45·0 | ... | SW, calm, N | 0 to 1 | bc. |
| 26 | ·664 | ·618 | ·624 | 42·0 | 35·0 | 38·29 | ... | ... | ... | 54·8 | 55·5 | 54·2 | 40·50 | ... | 45·0 | ... | NNE, E | 1 to 3 | obc. oc. |
| 27 | ·650 | ·714 | ·719 | 41·5 | 37·0 | 38·37 | ... | ... | ... | 55·5 | 56·0 | 55·0 | 42·33 | ... | 45·0 | ... | W, N, calm, SW | 0 to 1 | oc. obc. |
| 28 | ·748 | ·720 | ·737 | 41·0 | 34·0 | 37·83 | ... | ... | ... | 56·5 | 56·5 | 56·5 | 41·25 | ... | 44·5 | ... | SSW, calm | 0 to 1 | obc. oc. |
| 29 | ·780 | ·864 | ·839 | 41·0 | 35·0 | 38·25 | ... | ... | ... | 55·2 | 54·5 | 55·0 | 40·92 | ... | 44·0 | ... | N, calm | 0 to 1 | oc. c. |
| 30 | ·810 | ·780 | ·735 | 48·0 | 36·0 | 41·29 | ... | ... | ... | 52·5 | 53·0 | 55·8 | 43·66 | ... | 44·5 | ... | Calm | 0 | o. c. |
| 31 | ·680 | ·664 | ·669 | 46·0 | 37·0 | 40·79 | ... | ... | ... | 52·5 | 52·8 | 54·5 | 44·17 | ... | 44·5 | ... | ESE, W | 1 to 4 | bc. |
| Max. | 29·886 | 29·900 | ... | 48·0 | | | | | | | | | | | | | | | |
| Min. | 29·350 | 29·365 | ... | ... | 32·0 | | | | | | | | | | | | | | |
| Mean | 29·678 | 29·686 | 29·684 | ... | ... | 38·12 | ... | ... | ... | 48·4 | 53·5 | 54·8 | 46·19 | ... | 44·7 | | | | |

# AUGUST, 1854.

*Disaster Bay, Wellington Channel, 75° 31′ N., 92° 10′ W.*

| Date. | Barometer. | | | Thermometer. | | | | | | | | | | | | Wind. | | Weather. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Deck. | | | Ice. | | | Lower Deck. | | | Cabin. | Upper Deck, M.H. | Spirit Room. | Main Hold. | Direction. | Force. | |
| | Noon. | Midnt. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Bows. | Main Mast. | Gun Room. | | | | | | | |
| Aug. 1 | 29·662 | 29·654 | 29·641 | 44·0 | 35·0 | 37·92 | ... | ... | ... | 55·6 | 55·2 | 55·5 | 42·08 | ... | 44·5 | ... | E, S, N | 1 to 3 | b c. |
| 2 | ·604 | ·598 | ·588 | 48·0 | 37·0 | 42·75 | ... | ... | ... | 53·4 | 53·7 | 50·8 | 50·33 | ... | 44·5 | ... | ESE, N, E | 1 to 5 | b c. b c q. |
| 3 | ·548 | ·488 | ·480 | 43·0 | 37·0 | 40·17 | ... | ... | ... | 50·0 | 53·0 | 48·5 | 48·60 | ... | 44·5 | ... | E, ENE | 5 to 6 | o c. |
| 4 | ·430 | ·500 | ·506 | 47·0 | 36·0 | 41·08 | ... | ... | ... | 49·6 | 53·5 | 51·8 | 44·92 | ... | 44·5 | ... | ESE, E, SE | 3 to 4 | b c. c. b c. |
| 5 | ·610 | ·614 | ·631 | 48·0 | 36·0 | 39·87 | ... | ... | ... | 51·8 | 53·7 | 52·5 | 43·66 | ... | 45·0 | ... | E, calm, SW | 0 to 5 | o c m. o h. o c. |
| 6 | ·668 | ·724 | ·723 | 39·0 | 32·0 | 36·00 | ... | ... | ... | 52·5 | 53·2 | 51·5 | 40·25 | ... | 45·0 | ... | SW, calm | 0 to 1 | o c. o f. |
| 7 | ·722 | ·694 | ·692 | 42·5 | 33·0 | 36·29 | ... | ... | ... | 52·8 | 52·8 | 52·3 | 39·50 | ... | 45·0 | ... | S, calm, E | 0 to 2 | b g f. f. b c. |
| 8 | ·670 | ·736 | ·795 | 42·5 | 37·0 | 40·17 | ... | ... | ... | 52·2 | 52·5 | 52·8 | 42·33 | ... | 45·5 | ... | Calm, E, WSW, NE | 0 to 6 | b c. b c q. b c. |
| 9 | ·970 | ·940 | ·932 | 46·0 | 35·0 | 39·83 | ... | ... | ... | 52·5 | 53·7 | 51·6 | 43·00 | ... | 45·0 | ... | SE, ESE, E | 1 to 5 | b c. b c q. b c. |
| 10 | ·900 | ·870 | ·862 | 38·0 | 31·0 | 34·66 | ... | ... | ... | 53·0 | 54·0 | 51·3 | 39·75 | ... | 45·0 | ... | SW, calm, NW | 0 to 4 | f. o q. b c. |
| 11 | ·832 | ·850 | ·867 | 40·0 | 35·0 | 36·79 | ... | ... | ... | 53·0 | 54·5 | 53·8 | 45·83 | ... | 45·0 | ... | E, NW | 1 to 3 | o c. b c. |
| 12 | ·900 | ·876 | ·872 | 42·0 | 31·5 | 36·33 | ... | ... | ... | 53·2 | 53·7 | 51·5 | 41·25 | ... | 46·0 | ... | N, W, calm | 0 to 3 | b c. |
| 13 | ·846 | ·800 | ·787 | 43·0 | 30·0 | 37·00 | ... | ... | ... | 52·8 | 54·2 | 52·5 | 40·25 | ... | 45·0 | ... | Calm, NW, calm | 0 to 1 | b c. o b c. |
| 14 | ·700 | ·600 | ·600 | 34·0 | 31·0 | 32·25 | ... | ... | ... | 55·2 | 56·7 | 53·3 | 38·42 | ... | 44·5 | ... | N, SSW | 1 to 1 | e o. c o m s. |
| 15 | ·560 | ·644 | ·666 | 39·0 | 31·0 | 34·58 | ... | ... | ... | 53·8 | 54·6 | 51·0 | 38·00 | ... | 44·0 | ... | Calm, SSW, W | 0 to 1 | o c m. f. |
| 16 | ·806 | ·890 | ·892 | 40·0 | 30·0 | 34·54 | ... | ... | ... | 53·3 | 54·8 | 51·5 | 38·58 | ... | 44·0 | ... | Calm, NW | 0 to 2 | f. o c. o c m. |
| 17 | ·930 | ·936 | ·929 | 35·0 | 30·0 | 32·33 | ... | ... | ... | 49·8 | 50·5 | 52·0 | 41·58 | ... | 44·0 | ... | Calm, S, NW | 0 to 5 | o f. o c. b e q. |
| 18 | ·896 | ·880 | ·868 | 37·8 | 30·0 | 33·62 | ... | ... | ... | 51·3 | 51·3 | 52·2 | 39·84 | ... | 44·0 | ... | WSW, N | 1 to 4 | b c. b c q. |
| 19 | ·876 | ·828 | ·866 | 40·0 | 29·5 | 34·42 | ... | ... | ... | 52·5 | 52·5 | 53·7 | 39·00 | ... | 44·0 | ... | N, variable, calm | 0 to 5 | b c. |
| 20 | ·870 | ·888 | ·890 | 38·0 | 30·0 | 32·92 | ... | ... | ... | 53·5 | 54·7 | 54·5 | 38·58 | ... | 44·0 | ... | Calm, N | 0 to 1 | b c. |
| 21 | ·878 | ·864 | ·867 | 41·0 | 31·0 | 35·42 | ... | ... | ... | 53·5 | 55·0 | 54·8 | 44·58 | ... | 44·5 | ... | Calm, SE, calm | 0 to 1 | f. |
| 22 | ·834 | ·834 | ·829 | 36·0 | 30·0 | 32·50 | ... | ... | ... | 53·5 | 54·3 | 55·3 | 42·00 | ... | 44·5 | ... | Calm, NW, WNW | 0 to 2 | f. o c m. |
| 23 | ·828 | ·800 | ·789 | 33·0 | 28·0 | 31·12 | ... | ... | ... | 53·5 | 54·5 | 54·9 | 40·17 | ... | 44·0 | ... | NNW, calm | 0 to 3 | f. b c. o c f. |
| 24 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | |
| Max. | 29·980 | 29·940 | ... | 48·0 | | | | | | | | | | | | | | | |
| Min. | 29·430 | 29·500 | ... | ... | 28·0 | | | | | | | | | | | | | | |
| Mean | 29·764 | 29·761 | 29·765 | ... | ... | 36·20 | ... | ... | ... | 52·7 | 53·7 | 52·7 | 41·84 | ... | 44·6 | | | | |

# G.

*Comparative Tables of Temperature, obtained from Arctic Voyages,* 1819 *to* 1855.

These Tables were compiled from documents collected by me from private sources, as well as from the published Journals of Sir Edward Parry, on his voyages within Lancaster Sound.

In the course of my Narrative it will appear that I have long entertained the opinion connected with climates where the temperature descends much below the freezing-point, that there periodic depressions or low temperatures occur preceding, as well as following, the commonly termed winter, and sudden elevations also at apparently undue seasons.

Before I had more than *suspected* these matters to have any ground for discussion, I had relied sufficiently on my own opinion, to found my orders for sledge motions on the approaching spring travel of 1853; and as regarded other matters, as cutting out, taking down housings, etc., I had also formed distinct estimates of the dates for carrying out these special points of service. I then determined to construct these Tables, and was peculiarly struck with the coincidence of periods, etc., in confirmation of my views. I became more decisive in my orders for the period of starting, and I was able to estimate, from the mean temperatures of preceding years, when the cold weather should terminate.

I have already stated fully my views as to particular periods of cold temperatures: thus, between the 1st and 10th November,* 20th to 25th December, and 10th to 15th March, I expected very decided and

* In reference to the published Meteorological Tables for Lake Athabasca in 1843–4, situated in lat. 58° 43′ N., I notice November 12th, −6·8°, plus signs preceding and following; December 12th, +6·5°; 14th, −22·9°; January 9th, 1844, −38°; March 9th, −17·60°; all according with those periods, or, as I imagine, dependent on the full or change of the moon nearest to those dates. In some years the period may be deranged by the date occurring seven days earlier or later.

severe cold, sufficient to guide me in securing my sledge crews from exposure to undue severity of climate. These matters may appear trivial, but it must occur to all intelligent minds that the onerous duties of command or of responsibility, to the thinking portion of the world, are somewhat relieved by the studies of science.

Having constructed my Table, I was not a little surprised to find the peculiar coincidence throughout the whole range between 1819 and 1854,—thirty-five years. If the reader will run his pencil through the low temperatures at the periods which I have suggested, he perhaps will feel as much astonished as I was to find how slightly the lines deviate from that which would almost indicate precise *seasons*.

In the computation of the Table of Mean Cold it is also curious to find the mean amount to agree so closely; and in the spring of 1854—the coldest season experienced in those regions—I was able to compute nearly the moment when the cold, due to the season, had reached the full amount.

If these researches afforded no further value than occupation for the mind under such a species of captivity, it certainly had so far a beneficial result; but I thought that the question thus started, with the complete documents in my possession, might, at some future date, induce others to pursue this matter to a more satisfactory result. They are curious and interesting, and as such I have deemed them worthy of record.

# OCTOBER.

| Date. | Hecla, 1819. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1824. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1848. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1850. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1852. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1853. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1852. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Sep. 30 | 7·0 | 4·0 | 5·92 | 28·0 | 19·5 | 25·96 | 19·0 | 8·0 | 13·0 | 14·0 | 8·0 | 10·6 | 24·0 | 20·0 | 23·30 | 14·5 | 1·0 | 7·750 | 15·0 | 11·0 | 12·3 |
| Oct. 1 | 9·0 | 6·0 | 6·83 | 18·0 | 13·5 | 16·87 | 25·5 | 18·5 | 21·5 | 14·0 | 8·0 | 10·6 | 24·5 | 29·0 | 19·89 | 21·0 | 4·0 | 12·500 | 12·0 | 9·0 | 2·5 |
| 2 | 17·5 | 9·5 | 12·83 | 18·0 | 13·0 | 15·46 | 27·0 | 9·0 | 21·7 | 17·0 | 9·0 | 14·5 | 24·5 | 5·0 | 14·18 | 22·0 | 9·0 | 15·500 | 11·0 | 4·0 | 6·6 |
| 3 | 10·0 | 6·0 | 8·75 | 15·0 | 5·0 | 10·04 | 7·0 | 1·5 | 4·0 | 10·5 | - 9·0 | 4·5 | - 3·0 | 9·0 | 6·33 | 20·0 | 5·0 | 12·500 | 10·5 | 6·0 | 8·2 |
| 4 | 16·0 | 5·0 | 9·83 | 25·0 | 13·0 | 21·25 | 16·5 | 1·5 | 10·5 | 2·0 | -14·5 | - 9·6 | 7·0 | 2·0 | 4·46 | 12·5 | 5·0 | 8·750 | 18·0 | 11·0 | 14·0 |
| 5 | 13·0 | - 7·0 | 3·00 | 27·0 | 25·0 | 26·21 | 10·5 | 6·5 | 8·7 | 0·0 | -14·0 | 8·7 | 5·0 | 3·0 | 4·08 | 14·0 | 2·0 | 8·000 | 16·0 | 2·0 | 10·2 |
| 6 | 8·0 | - 8·0 | 1·80 | 31·5 | 18·0 | 25·96 | 8·5 | 1·5 | 4·7 | 7·0 | - 8·0 | 1·7 | 9·0 | - 6·5 | - 1·00 | 12·0 | - 2·0 | 5·000 | 3·0 | 4·0 | - 2·0 |
| 7 | 15·0 | 0·0 | 6·10 | 26·0 | 9·5 | 20·40 | 10·0 | 0·0 | 5·0 | 7·0 | 0·5 | 3·7 | -11·0 | -16·0 | -13·75 | 6·5 | - 9·0 | -1·750 | 4·0 | 5·0 | - 0·8 |
| 8 | 1·0 | - 8·5 | 3·75 | 21·0 | 13·0 | 14·86 | 8·0 | 0·5 | 4·3 | 4·0 | - 3·5 | 1·3 | 11·0 | 3·0 | 5·25 | 6·5 | - 3·0 | 1·750 | 4·0 | 1·5 | 2·0 |
| 9 | 0·0 | - 5·0 | - 1·83 | 22·0 | 12·0 | 18·08 | 6·1 | 1·0 | 3·5 | 13·0 | 6·0 | 9·9 | 7·0 | - 3·5 | 5·50 | 3·5 | -15·0 | -5·750 | 8·0 | 0·0 | 4·8 |
| 10 | 5·0 | - 3·0 | 1·83 | 18·5 | 13·0 | 15·62 | 5·0 | - 3·5 | 1·2 | 9·0 | 1·5 | 5·1 | 24·0 | 4·0 | 9·81 | 5·5 | 15·0 | 10·800 | 12·0 | 2·0 | 5·4 |
| 11 | 10·2 | 2·0 | 4·54 | 19·0 | 11·0 | 13·50 | 4·5 | 3·0 | 1·7 | 4·0 | - 2·5 | 0·2 | 23·0 | -12·0 | 0·23 | 23·5 | 13·5 | 19·000 | 24·0 | 11·0 | 17·5 |
| 12 | 7·0 | - 8·0 | - 4·17 | 19·0 | 11·0 | 14·71 | 3·5 | 3·5 | 0·5 | 13·5 | 6·0 | 10·7 | - 2·0 | - 8·5 | - 4·23 | 23·0 | 20·0 | 21·410 | 30·0 | 11·0 | 25·9 |
| 13 | 16·0 | 3·0 | 7·60 | 23·0 | 8·5 | 15·71 | - 0·5 | - 5·0 | - 1·5 | 16·0 | 5·0 | 12·0 | 3·5 | - 8·0 | - 1·00 | 25·5 | 21·0 | 22·540 | 8·0 | - 2·0 | 4·5 |
| 14 | 5·0 | - 6·0 | - 2·50 | 29·0 | 18·5 | 24·83 | 0·5 | - 5·5 | - 2·5 | 8·5 | 1·5 | 4·7 | - 5·0 | -17·0 | -10·06 | 26·5 | 22·5 | 24·340 | 15·0 | 11·0 | 13·5 |
| 15 | 13·0 | 0·0 | 6·17 | 21·0 | 15·0 | 17·83 | 6·0 | 2·5 | 1·7 | 8·5 | - 5·0 | 2·3 | -12·0 | -22·0 | -17·94 | 22·0 | 19·5 | 20·380 | 16·0 | 8·0 | 13·3 |
| 16 | - 1·0 | -12·5 | - 5·26 | 25·0 | 20·0 | 21·50 | 18·0 | 13·0 | 15·2 | 0·0 | - 9·0 | - 3·4 | - 3·0 | -15·0 | - 8·33 | 23·5 | 22·0 | 22·800 | 16·0 | 11·0 | 13·8 |
| 17 | -10·5 | -16·0 | -12·88 | 21·0 | 9·0 | 15·62 | 19·5 | 14·0 | 17·0 | - 1·5 | -10·0 | - 6·0 | - 4·0 | - 9·5 | - 6·00 | 23·0 | 20·5 | 21·700 | 19·0 | 7·0 | 15·7 |
| 18 | - 2·0 | -14·0 | - 6·08 | 18·0 | 7·5 | 13·42 | 17·0 | - 2·5 | 7·0 | 11·0 | - 5·0 | 1·7 | - 4·0 | - 9·5 | - 5·60 | 22·0 | 17·0 | 18·750 | 12·0 | - 2·0 | 5·9 |
| 19 | - 7·0 | -14·0 | -11·25 | 8·0 | 4·0 | 6·37 | 10·5 | - 4·0 | 5·7 | 4·5 | -11·0 | - 3·1 | 0·5 | - 5·5 | - 2·27 | 20·0 | 17·5 | 19·620 | 15·0 | 12·0 | 14·2 |
| 20 | -13·5 | -17·5 | -15·12 | 4·0 | 0·0 | 1·83 | 10·5 | 7·0 | 8·5 | 0·0 | -12·0 | - 5·6 | 11·0 | - 2·0 | 7·65 | 18·0 | 1·5 | 7·250 | 14·0 | 3·0 | 10·0 |
| 21 | - 7·0 | -14·0 | -10·58 | 5·0 | 2·0 | 3·96 | 15·0 | - 1·5 | 6·0 | - 2·5 | - 7·5 | - 5·1 | 13·5 | 1·5 | 9·83 | 7·0 | - 6·0 | 1·583 | 2·0 | -12·0 | - 6·4 |
| 22 | - 3·0 | -14·0 | - 6·92 | 4·0 | - 4·0 | 2·08 | - 2·0 | - 9·0 | - 6·0 | 1·0 | - 9·5 | - 4·0 | 2·5 | - 6·5 | - 3·70 | - 2·5 | - 9·0 | -4·375 | 0·0 | 9·0 | 4·5 |
| 23 | 6·0 | - 9·0 | 0·12 | 5·0 | - 1·0 | 2·96 | 18·0 | 5·5 | 9·7 | 2·0 | -15·0 | - 6·0 | - 6·0 | -10·5 | - 8·30 | 1·5 | - 7·0 | -4·188 | 9·0 | 7·0 | 2·4 |
| 24 | 1·0 | - 6·0 | - 2·83 | 7·5 | 4·0 | 5·87 | 26·0 | 19·0 | 22·5 | 3·5 | - 2·5 | 0·9 | - 2·0 | - 7·5 | - 4·42 | 9·5 | 1·5 | 6·375 | 9·0 | 4·0 | 9·0 |
| 25 | 5·0 | 2·0 | 3·71 | 10·0 | 3·0 | 6·17 | 24·5 | 19·0 | 22·0 | 4·0 | - 1·5 | 1·1 | 1·0 | - 7·5 | - 3·00 | 10·0 | 1·0 | 7·916 | 3·0 | - 7·0 | 0·2 |
| 26 | 4·0 | - 8·0 | - 1·08 | 8·5 | 3·0 | 5·17 | 28·5 | 19·5 | 24·0 | - 0·5 | -11·5 | - 6·0 | 3·0 | - 8·5 | - 3·30 | 4·0 | - 7·0 | -1·000 | 4·0 | 3·5 | 1·4 |
| 27 | - 4·0 | -15·0 | -10·25 | 3·0 | - 1·0 | 1·00 | 32·0 | 25·0 | 29·0 | - 3·0 | -12·0 | - 6·0 | - 2·0 | - 8·5 | - 4·06 | 1·0 | -11·7 | -4·800 | 1·0 | 9·0 | - 2·0 |
| 28 | -17·0 | -23·0 | -19·75 | - 3·0 | -12·0 | - 7·87 | 29·0 | 18·0 | 24·2 | -10·0 | -19·0 | -14·0 | - 1·0 | - 5·5 | - 2·62 | 0·0 | -12·7 | -5·080 | 0·0 | 3·0 | 2·4 |
| 29 | -20·0 | -28·0 | -24·25 | 1·0 | -10·5 | - 4·50 | 27·5 | 13·5 | 22·0 | -12·0 | -17·0 | -14·7 | - 2·0 | -11·5 | - 5·87 | - 4·5 | -12·5 | -7·800 | - 3·0 | 17·0 | 11·1 |
| 30 | -25·0 | -27·5 | -26·15 | - 5·0 | -11·0 | - 8·92 | 22·0 | - 2·5 | 14·1 | 0·0 | -17·0 | - 4·9 | 1·0 | - 6·0 | - 2·30 | 1·0 | - 6·0 | -2·700 | - 6·0 | 15·0 | 11·7 |
| 31 | - 4·0 | -28·0 | -12·17 | 1·0 | - 8·0 | - 1·29 | - 3·0 | -14·0 | - 7·7 | - 1·0 | -10·5 | - 6·2 | - 4·0 | -21·0 | -13·75 | 0·0 | -14·5 | -4·710 | -10·0 | 12·0 | 17·4 |
| 31 days | 17·5 | -28·0 | - 3·46 | 31·5 | -12·0 | 10·85 | 32·0 | -14·0 | 9·7 | 17·0 | -19·0 | - 0·6 | 24·5 | -22·0 | - 1·40 | 26·5 | -15·0 | 10·258 | 30·0 | -17·0 | 4·1 |

# NOVEMBER.

| Date. | Hecla, 1819. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1824. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1848. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1850. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1852. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1853. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1852. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Nov. 1 | 2·0 | - 3·0 | - 1·00 | 5·0 | - 4·0 | - 1·17 | - 2·5 | -15·0 | - 8·5 | - 6·0 | -17·0 | -12·1 | -14·0 | -21·0 | -15·70 | 7·0 | -21·0 | - 7·583 | *-14·0 | *-21·0 | *-17·00 |
| 2 | 5·0 | 0·0 | 3·25 | 5·0 | 1·0 | 2·92 | 15·0 | 2·0 | 7·5 | -11·0 | -20·5 | -14·5 | -21·0 | -23·5 | -22·60 | 4·0 | - 1·5 | 1·291 | -15·0 | -17·0 | -16·50 |
| 3 | 6·0 | 0·0 | 3·92 | 6·5 | 4·0 | 5·28 | 16·0 | 7·0 | 8·0 | -11·0 | -17·0 | -14·6 | -18·0 | -26·5 | -26·20 | 5·0 | 2·0 | 3·541 | -11·5 | -18·0 | -14·60 |
| 4 | 6·0 | 5·0 | 5·50 | 10·0 | 4·5 | 7·08 | - 5·5 | -13·0 | -10·0 | 0·0 | -10·0 | - 6·3 | -24·0 | -28·0 | -24·06 | 2·0 | - 4·0 | - 1·275 | -10·0 | -13·0 | - 9·20 |
| 5 | 6·0 | - 7·0 | - 0·67 | 12·0 | 1·0 | 9·50 | -12·0 | -23·5 | -16·1 | - 1·5 | - 6·0 | - 4·1 | -22·0 | -27·5 | -25·46 | 2·0 | - 3·0 | - 0·375 | -12·0 | -19·0 | -15·70 |
| 6 | - 8·0 | -18·0 | -14·08 | - 1·0 | - 7·0 | - 3·54 | - 1·0 | -11·0 | - 7·3 | 0·0 | - 4·0 | - 2·2 | -10·0 | -21·0 | -13·80 | 1·0 | -12·5 | - 6·125 | -20·0 | -23·5 | -22·20 |
| 7 | - 6·5 | -16·0 | -11·12 | - 8·0 | -18·0 | -13·12 | 2·5 | -12·0 | - 4·0 | 0·0 | -11·0 | - 4·1 | -13·0 | -28·0 | -17·91 | - 6·0 | -18·5 | -12·000 | -17·0 | -22·0 | -19·30 |
| 8 | - 5·0 | -13·0 | -10·04 | 2·0 | -17·0 | - 6·25 | -12·0 | -19·0 | -16·3 | -10·0 | -19·0 | -13·5 | -10·0 | -26·0 | -19·27 | -15·5 | -33·0 | -27·533 | -22·0 | -23·0 | -22·30 |
| 9 | -11·0 | -15·0 | 12·75 | 8·0 | - 1·0 | 4·64 | -16·5 | -26·5 | -20·3 | - 2·0 | -19·0 | -11·9 | - 6·0 | -19·5 | -15·84 | -21·0 | -33·0 | -27·583 | -17·0 | -21·0 | -18·20 |
| 10 | - 6·5 | -15·0 | - 9·67 | 10·0 | 2·0 | 5·58 | -18·5 | -28·0 | 22·3 | 7·0 | - 2·0 | 4·0 | 20·0 | -10·0 | - 4·00 | -14·0 | -28·0 | -21·875 | 12·0 | -27·0 | -17·00 |
| 11 | -13·0 | -26·5 | -18·62 | 4·0 | - 4·0 | 1·12 | 3·5 | -20·0 | - 5·8 | 13·0 | - 1·0 | 7·7 | 0·0 | - 8·0 | - 0·70 | -12·5 | -14·0 | -13·416 | 14·0 | -22·0 | -17·70 |
| 12 | - 4·0 | -32·0 | -28·58 | 8·5 | -13·0 | -11·64 | -1·0 | -28·0 | -17·0 | - 2·0 | -21·5 | -13·6 | 1·0 | - 1·5 | 0·66 | -14·0 | -23·0 | -17·500 | 28·0 | -36·0 | 32·20 |
| 13 | -24·0 | -34·0 | -28·50 | - 8·0 | -11·0 | - 9·79 | - 5·0 | -21·5 | -13·0 | - 7·0 | -23·0 | -16·1 | 2·5 | - 4·5 | 0·70 | -13·5 | -17·5 | -14·583 | 26·0 | -32·0 | 28·70 |
| 14 | -25·0 | -32·0 | -26·08 | 5·0 | -14·0 | 6·29 | 12·0 | 5·5 | 4·3 | -10·0 | -23·5 | -14·7 | 13·5 | - 9·0 | 3·90 | -14·0 | -20·0 | 17·000 | 28·0 | -33·0 | 30·20 |
| 15 | -21·0 | -40·0 | -30·88 | 8·0 | 2·0 | 5·08 | 13·0 | 13·0 | 4·5 | - 3·0 | -10·0 | - 5·4 | 13·0 | -14·0 | - 4·20 | -22·0 | -29·5 | 24·750 | 27·0 | -30·0 | -28·60 |
| 16 | -36·0 | -42·0 | -39·79 | - 5·0 | -17·5 | -13·21 | -10·5 | -27·5 | -16·8 | - 3·0 | - 8·0 | - 5·4 | 10·0 | -16·0 | - 4·00 | -19·0 | -27·0 | 23·100 | 18·0 | -27·0 | -21·50 |
| 17 | -30·0 | -40·0 | -35·63 | - 8·5 | -14·0 | -11·29 | -10·0 | -31·5 | -22·8 | 0·0 | - 8·0 | - 3·2 | 20·0 | 12·0 | 14·50 | -15·0 | -24·5 | 18·750 | 15·0 | 23·0 | 18·20 |
| 18 | -34·0 | -37·0 | -36·00 | - 9·0 | -18·5 | -13·04 | - 7·0 | -16·5 | -11·8 | - 7·0 | -16·0 | -14·0 | 21·0 | 18·0 | 19·00 | -14·0 | -25·0 | 17·833 | 14·0 | 23·0 | 18·10 |
| 19 | -38·0 | -47·0 | -42·92 | -14·0 | -21·0 | -18·04 | -13·5 | -18·0 | -15·5 | - 1·5 | -11·5 | - 6·7 | 18·0 | 11·0 | 14·56 | -16·0 | -26·0 | 21·458 | 15·0 | 24·0 | 19·40 |
| 20 | -40·0 | -47·0 | -43·71 | -12·5 | -23·0 | -19·42 | - 8·0 | -23·0 | -17·8 | 1·5 | - 2·0 | - 1·0 | 17·0 | 12·0 | 14·37 | -14·0 | 24·0 | 17·625 | 16·0 | 31·5 | 24·80 |
| 21 | -20·0 | -40·5 | -27·79 | - 8·5 | -17·0 | -11·96 | -18·0 | -27·5 | -24·0 | 2·0 | - 9·5 | - 4·9 | 17·0 | 15·0 | 16·21 | -17·0 | 23·0 | 21·166 | 30·0 | 38·0 | 34·60 |
| 22 | -21·0 | -25·0 | -23·00 | - 6·0 | -18·0 | -13·54 | -14·0 | -20·5 | -16·5 | - 1·5 | - 8·0 | - 5·7 | 17·0 | - 9·0 | 3·00 | -23·0 | 26·0 | 24·625 | 27·0 | -39·0 | 32·70 |
| 23 | ... | ... | -25·00 | 2·0 | 19·0 | 13·08 | -12·5 | -20·0 | -15·5 | - 3·0 | - 9·5 | - 6·1 | - 5·0 | -12·5 | - 9·85 | -26·0 | 34·0 | 29·708 | -26·0 | -29·0 | -26·80 |
| 24 | ... | ... | -15·00 | 1·0 | -15·5 | - 6·83 | 13·0 | -24·5 | 21·0 | - 7·0 | -11·0 | - 8·9 | - 1·5 | -10·5 | - 7·60 | -31·0 | -36·0 | 33·041 | -26·0 | -38·0 | -32·70 |
| 25 | - 5·0 | -18·0 | -11·75 | -10·0 | -23·5 | -16·92 | 21·5 | -29·0 | 24·5 | - 2·5 | - 6·0 | - 4·0 | - 5·0 | -11·0 | - 9·85 | -34·0 | 37·0 | 35·458 | -33·0 | -39·0 | -36·50 |
| 26 | -20·0 | -28·0 | -24·79 | 7·0 | -26·0 | 16·12 | 22·0 | -28·0 | 25·0 | - 4·0 | -11·5 | - 7·7 | 0·0 | - 7·0 | - 3·63 | -30·0 | 36·0 | 32·375 | 14·5 | -31·0 | -13·90 |
| 27 | -13·0 | -28·5 | -18·38 | 17·0 | 7·0 | 13·12 | 16·5 | -23·0 | 19·5 | - 6·0 | -11·0 | - 9·2 | 0·5 | -11·0 | - 5·50 | -28·0 | 33·0 | 30·125 | 12·0 | -16·0 | -13·80 |
| 28 | -24·5 | -32·0 | -28·29 | 10·5 | - 8·0 | 1·92 | 17·0 | -27·0 | 20·8 | - 3·5 | -10·0 | 7·9 | 4·5 | - 1·5 | 1·00 | -15·0 | -29·0 | 22·875 | 10·5 | -23·0 | 13·90 |
| 29 | -31·0 | -32·5 | -31·92 | 6·0 | - 8·0 | 2·00 | 28·0 | -37·5 | 33·5 | - 1·0 | - 4·0 | - 2·2 | - 1·5 | -22·0 | -14·80 | -13·0 | -22·0 | -19·208 | -13·0 | -25·0 | -20·30 |
| 30 | -32·0 | -34·0 | -33·58 | 8·0 | - 8·0 | - 2·46 | 26·5 | -37·5 | 33·8 | - 7·0 | -31·0 | -17·6 | -24·0 | -26·5 | -24·69 | -12·0 | -20·5 | -15·875 | -14·0 | -24·0 | -19·40 |
| 30 days | 6·0 | -47·0 | -20·60 | 17·0 | -26·0 | - 4·99 | 16·0 | -37·5 | -14·5 | 13·0 | -31·0 | - 7·5 | 20·2 | -30·2 | - 6·64 | 7·0 | -37·0 | -18·333 | -10·0 | -39·0 | -20·18 |

* ? The signs not copied: probably the same as those of the 'Assistance,' 1852.

# DECEMBER.

| Date. | Hecla, 1819. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1824. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1848. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1850. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1852. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1853. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1852. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Nov. 30 | -32·0 | -34·0 | -33·58 | - 3·0 | - 8·0 | - 2·46 | -26·5 | -37·2 | -33·8 | - 7·0 | -31·0 | -17·6 | -24·0 | -26·5 | -24·70 | -12·0 | -20·5 | -15·873 | -14·0 | -24·0 | -19·40 |
| Dec. 1 | -25·0 | -34·0 | -30·29 | -11·0 | -20·5 | -16·42 | -26·0 | -30·5 | -28·8 | -32·0 | -35·0 | -34·2 | -20·0 | -29·5 | -27·50 | -18·0 | -24·0 | -21·083 | -18·0 | -25·0 | -21·00 |
| 2 | -28·0 | -36·0 | -32·96 | -15·0 | -21·0 | -18·37 | -15·0 | -30·5 | -22·6 | -24·0 | -33·0 | -29·7 | -29·5 | -34·5 | -34·10 | -19·0 | -27·0 | -23·041 | -20·0 | -28·0 | -23·70 |
| 3 | - 9·0 | -23·0 | -16·04 | -12·0 | -16·0 | -14·25 | -14·0 | -26·5 | -22·8 | -15·5 | -22·5 | -19·6 | -17·0 | -34·0 | -33·38 | -15·0 | -20·0 | -17·250 | -19·0 | -27·0 | -23·70 |
| 4 | -26·0 | -34·0 | -31·71 | -16·0 | -20·0 | -18·17 | -14·5 | -27·5 | -21·5 | -26·0 | -20·0 | -22·5 | -16·0 | -31·5 | -26·77 | -16·0 | -31·0 | -22·791 | -26·0 | -38·0 | -34·20 |
| 5 | -27·0 | -35·0 | -31·25 | -20·0 | -24·0 | -21·58 | -27·5 | -32·5 | -30·0 | -18·5 | -21·0 | -19·8 | -31·0 | -35·0 | -35·23 | -31·0 | -35·5 | -33·666 | -37·0 | -40·0 | -38·70 |
| 6 | -23·0 | -34·0 | -27·00 | -11·5 | -22·0 | -18·17 | -23·0 | -41·0 | -33·2 | -16·5 | -21·0 | -19·3 | -29·0 | -36·5 | -33·81 | -31·0 | -35·0 | -32·708 | -32·0 | -40·0 | -36·50 |
| 7 | -19·0 | -26·0 | -22·29 | - 4·5 | -12·5 | - 9·25 | -28·0 | -37·5 | -31·9 | -18·5 | -23·0 | -20·1 | - 9·5 | -34·4 | -18·36 | -29·0 | -33·0 | -31·041 | -39·0 | -44·0 | -42·30 |
| 8 | -15·0 | -23·0 | -19·67 | -10·0 | -19·5 | -13·83 | -18·0 | -29·5 | -23·9 | -15·0 | -22·0 | -18·6 | - 6·0 | -18·7 | -12·00 | -32·5 | -37·0 | -34·583 | -36·0 | -42·0 | -38·40 |
| 9 | -17·0 | -21·0 | -18·83 | - 7·0 | -21·0 | -15·25 | -19·0 | -31·5 | -23·2 | -16·5 | -25·0 | -22·2 | -19·0 | -35·1 | -27·50 | -29·0 | -35·0 | -32·000 | -38·0 | -42·5 | -39·90 |
| 10 | -18·0 | -21·0 | -19·33 | - 9·5 | -20·0 | -15·58 | -30·0 | -34·0 | -31·8 | -24·0 | -29·0 | -28·0 | -30·0 | -37·5 | -35·37 | -34·5 | -38·0 | -36·250 | -42·0 | -45·0 | -43·90 |
| 11 | - 4·0 | -20·0 | -11·21 | - 6·5 | -14·0 | -11·13 | -28·5 | -33·5 | -31·4 | -28·0 | -34·0 | -31·5 | -30·0 | -38·0 | -35·80 | -35·0 | -40·0 | -36·958 | -40·0 | -43·0 | -41·50 |
| 12 | - 9·0 | -20·0 | -14·42 | - 5·0 | -17·0 | -10·58 | -33·5 | -44·0 | -37·0 | -32·5 | -35·5 | -33·8 | -30·0 | -37·0 | -34·00 | -27·0 | -39·0 | -33·666 | -29·0 | -39·0 | -35·70 |
| 13 | - 7·0 | -14·0 | -10·96 | -12·0 | -28·0 | -20·04 | -44·0 | -50·0 | -47·8 | -28·0 | -35·5 | -31·3 | -32·8 | -40·0 | -36·46 | -20·5 | -32·5 | -28·041 | -24·5 | -28·0 | -26·30 |
| 14 | - 7·0 | -10·0 | - 8·29 | -28·0 | -26·5 | -25·29 | -49·0 | -54·5 | -52·2 | -21·0 | -29·0 | -23·5 | -34·3 | -40·3 | -38·46 | -19·0 | -27·0 | -23·666 | -17·0 | -23·0 | -18·60 |
| 15 | - 7·0 | -15·0 | -11·63 | -26·0 | -34·5 | -30·54 | -50·0 | -56·5 | -53·1 | -20·5 | -24·0 | -23·2 | -24·8 | -36·3 | -31·80 | -27·0 | -31·0 | -29·250 | -20·0 | -23·0 | -21·10 |
| 16 | - 8·0 | -18·0 | -13·50 | -30·0 | -25·0 | -33·21 | -36·5 | -53·5 | -46·3 | -16·0 | -26·0 | -20·8 | -31·8 | -42·0 | -36·80 | -21·0 | -30·0 | -24·916 | -18·0 | -25·0 | -21·40 |
| 17 | - 0·0 | - 9·0 | - 4·37 | -25·5 | -31·0 | -27·96 | -25·0 | -36·5 | -31·8 | - 6·0 | -19·0 | -11·5 | -34·8 | -42·0 | -38·13 | -32·0 | -39·0 | -36·458 | -16·5 | -23·0 | -18·40 |
| 18 | - 3·0 | -11·0 | - 5·00 | -18·5 | -26·0 | -22·08 | -27·0 | -38·0 | -32·6 | -20·0 | -28·0 | -24·8 | -31·8 | -43·5 | -37·19 | -33·0 | -37·0 | -35·416 | -24·0 | -31·0 | -27·20 |
| 19 | - 9·0 | -24·0 | -17·46 | -13·0 | -17·5 | -14·83 | -27·0 | -40·0 | -32·4 | -23·0 | -30·0 | -25·8 | -27·8 | -31·0 | -31·25 | -16·0 | -35·0 | -25·416 | -29·0 | -33·5 | -30·80 |
| 20 | -19·0 | -25·0 | -22·83 | -14·0 | -28·0 | -19·54 | -38·0 | -47·0 | -41·1 | -20·0 | -32·0 | -26·0 | -26·0 | -28·6 | -27·25 | -17·0 | -30·5 | -23·666 | -26·0 | -29·0 | -27·90 |
| 21 | -19·0 | -25·0 | -23·50 | -25·0 | -33·0 | -29·17 | -43·0 | -50·5 | -46·6 | -15·0 | -20·5 | -18·1 | -26·5 | -31·3 | -28·17 | -25·0 | -37·0 | -30·875 | -29·0 | -35·0 | -31·90 |
| 22 | -27·0 | -35·0 | -31·00 | -25·0 | -30·0 | -26·67 | -32·0 | -46·0 | -37·8 | - 7·0 | -11·0 | -10·2 | -32·0 | -37·0 | -33·30 | -20·0 | -31·0 | -25·250 | -32·0 | -43·0 | -37·30 |
| 23 | -30·0 | -37·0 | -33·83 | -25·0 | -33·0 | -30·04 | -32·0 | -39·5 | -36·2 | - 5·0 | -15·0 | - 9·0 | -36·0 | -39·4 | -37·70 | -30·0 | -35·0 | -31·541 | -42·0 | -46·0 | -43·80 |
| 24 | -24·0 | -34·0 | -31·17 | -11·0 | -30·0 | -17·83 | -33·5 | -41·0 | -37·3 | -15·0 | -22·0 | -19·3 | -37·0 | -40·8 | -38·75 | -22·0 | -38·0 | -30·791 | -33·5 | -42·0 | -38·60 |
| 25 | -23·5 | -30·0 | -26·04 | -14·0 | -26·0 | -20·58 | -40·5 | -44·5 | -42·4 | -20·0 | -26·5 | -23·1 | -23·0 | -36·0 | -32·00 | -16·0 | -25·0 | -20·000 | -31·0 | -35·0 | -32·80 |
| 26 | - 5·0 | -34·0 | -16·21 | -22·5 | -27·0 | -25·71 | -44·5 | -52·0 | -48·5 | -11·0 | -26·0 | -17·8 | -17·0 | -36·8 | -25·50 | -19·0 | -28·5 | -25·916 | -34·0 | -44·0 | -39·30 |
| 27 | -17·0 | -32·0 | -24·58 | -12·0 | -22·0 | -16·93 | -44·0 | -50·0 | -45·7 | -13·0 | -26·0 | -17·7 | -36·5 | -40·2 | -39·75 | -21·0 | -32·0 | -26·166 | -42·0 | -45·0 | -43·70 |
| 28 | -34·0 | -39·0 | -36·75 | - 8·0 | -11·0 | - 9·21 | -39·0 | -44·5 | -42·8 | -11·0 | -30·0 | -20·2 | -37·0 | -42·5 | -39·66 | -26·5 | -46·0 | -40·333 | -41·0 | -45·5 | -43·20 |
| 29 | -34·0 | -40·0 | -37·38 | - 8·5 | -16·5 | -11·79 | -39·5 | -48·0 | -44·3 | - 9·5 | -31·0 | -24·1 | -29·0 | -44·3 | -35·35 | -35·0 | -46·5 | -43·041 | -42·0 | -46·0 | -43·80 |
| 30 | -30·0 | -43·0 | -38·96 | - 9·5 | -16·0 | -12·29 | -29·5 | -39·5 | -33·5 | -34·0 | -39·0 | -35·7 | -26·0 | -32·5 | -27·15 | - 7·0 | -29·0 | -17·625 | -15·0 | -43·0 | -28·70 |
| 31 | 6·0 | -28·0 | - 7·17 | -11·0 | -22·0 | -14·21 | -33·0 | -41·0 | -37·0 | -22·5 | -39·5 | -30·2 | -32·0 | -34·4 | -33·12 | 12·0 | - 7·0 | - 2·333 | - 8·0 | -18·0 | -12·40 |
| 31 days | 6·0 | -43·0 | -21·79 | - 4·5 | -35·0 | -19·05 | -14·0 | -56·5 | -36·4 | - 5·0 | -39·5 | -22·9 | - 6·0 | -46·7 | -35·51 | 12·0 | -46·5 | -28·083 | - 8·0 | -46·0 | -32·45 |

# JANUARY.

| Date. | Hecla, 1820. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1825. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1849. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1851. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1853. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1854. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Dec. 31 | - 6·0 | -28·0 | - 7·17 | -11·0 | -22·0 | -14·21 | -33·0 | -41·0 | -37·0 | -22·5 | -39·5 | -30·2 | -32·00 | -34·4 | -33·12 | -12·0 | - 7·00 | - 2·833 | - 8·0 | -18·0 | -12·40 |
| Jan. 1 | - 2·0 | -28·0 | -18·33 | -22·0 | -27·0 | -24·17 | -30·5 | -38·5 | -34·3 | -26·0 | -36·0 | -31·9 | -29·50 | -35·8 | -31·57 | -25·0 | -14·00 | -18·541 | -18·0 | -22·0 | -20·50 |
| 2 | -19·0 | -29·0 | -24·58 | -25·0 | -28·0 | -26·62 | -24·0 | -30·0 | -26·7 | -32·5 | -37·0 | -34·8 | -23·00 | -31·5 | -27·00 | -26·0 | - 2·50 | - 7·500 | -17·0 | -25·0 | -20·10 |
| 3 | -29·0 | -42·0 | -34·62 | -26·0 | -32·0 | -28·62 | -20·5 | -25·0 | -23·0 | -31·5 | -35·5 | -33·7 | -20·00 | -26·0 | -22·33 | - 7·0 | -21·00 | -15·416 | -26·0 | -33·0 | -29·00 |
| 4 | -34·0 | -44·0 | -10·17 | -27·0 | -32·5 | -29·58 | -16·5 | -24·5 | -20·8 | -27·0 | -35·0 | -31·9 | -26·00 | -42·2 | -34·80 | -18·5 | -28·50 | -24·625 | -19·0 | -32·0 | -25·80 |
| 5 | -26·0 | -35·0 | -32·00 | -31·5 | -36·0 | -33·54 | -18·0 | -27·5 | -22·8 | -27·0 | -31·0 | -28·8 | -42·50 | -48·0 | -45·08 | -27·0 | -35·00 | -31·458 | -22·0 | -32·0 | -26·90 |
| 6 | -22·0 | -33·0 | -28·58 | -27·0 | -34·0 | -31·92 | -28·5 | -36·0 | -32·7 | -30·0 | -33·5 | -31·0 | -47·00 | -51·5 | -49·02 | -24·0 | -30·00 | -26·708 | -30·0 | -36·0 | -32·70 |
| 7 | -32·0 | -40·0 | -37·67 | -32·5 | -35·0 | -33·87 | - 9·5 | -31·0 | -20·7 | -29·0 | -35·5 | -33·5 | -37·00 | -49·3 | -38·01 | -25·0 | -33·00 | -29·833 | -35·0 | -42·0 | -38·80 |
| 8 | -33·0 | -38·0 | -35·83 | -21·5 | -32·0 | -28·46 | -25·5 | -34·0 | -30·1 | -23·0 | -26·5 | -24·8 | -39·00 | -47·5 | -43·00 | -34·0 | -39·00 | -36·291 | -41·0 | -44·0 | -42·70 |
| 9 | -33·0 | -35·0 | -34·42 | -20·5 | -24·5 | -22·42 | -19·5 | -25·5 | -22·3 | -25·0 | -35·0 | -29·8 | -46·50 | -50·0 | -47·97 | -37·0 | -45·00 | -41·333 | -42·0 | -45·0 | -43·40 |
| 10 | -32·0 | -43·0 | -36·17 | -25·5 | -36·0 | -31·54 | -24·0 | -40·5 | -31·7 | -11·0 | -34·0 | -24·5 | -49·50 | -56·0 | -54·17 | -43·0 | -45·00 | -44·666 | -33·0 | -44·0 | -40·00 |
| 11 | -43·0 | -46·0 | -44·42 | -35·0 | -38·0 | -36·87 | -38·0 | -50·0 | -44·7 | - 9·0 | -25·0 | -19·6 | -59·50 | -57·0 | -54·31 | -40·0 | -44·00 | -41·625 | -33·0 | -44·0 | -38·60 |
| 12 | -42·0 | -47·0 | -44·71 | -37·5 | -39·0 | -38·08 | -44·0 | -48·0 | -45·9 | -17·0 | -35·5 | -23·9 | -53·50 | -59·5 | -56·25 | -40·0 | -43·00 | -41·583 | -36·0 | -44·0 | -40·20 |
| 13 | -40·5 | -47·0 | -45·29 | -15·0 | -38·0 | -24·04 | -42·5 | -48·5 | -45·7 | -35·5 | -40·5 | -38·1 | -45·00 | -62·5 | -54·23 | -39·0 | -43·50 | -41·250 | -24·5 | -42·0 | -32·20 |
| 14 | -32·0 | -40·0 | -35·08 | -15·0 | -20·0 | -18·08 | -42·5 | -47·0 | -45·2 | -31·5 | -37·0 | -34·8 | -46·00 | -50·0 | -48·00 | -27·5 | -44·00 | -37·541 | -22·0 | -29·0 | -25·40 |
| 15 | -34·0 | -39·0 | -35·73 | -20·5 | -28·0 | -25·67 | -42·0 | -46·0 | -44·5 | -33·5 | -38·5 | -36·7 | -42·00 | -52·0 | -47·65 | -28·0 | -37·50 | -32·791 | -30·0 | -34·0 | -31·90 |
| 16 | -34·0 | -39·0 | -37·08 | -27·0 | -34·0 | -29·58 | -33·5 | -41·0 | -35·6 | -37·0 | -39·5 | -38·2 | -17·00 | -49·0 | -36·90 | -35·0 | -40·70 | -38·375 | -31·0 | -46·0 | -40·70 |
| 17 | -16·0 | -34·0 | -21·50 | -25·0 | -33·0 | -28·29 | -29·5 | -37·0 | -34·6 | -35·5 | -39·0 | -38·0 | -12·00 | -16·0 | -12·96 | -43·0 | -49·70 | -46·750 | -37·0 | -43·0 | -40·70 |
| 18 | - 5·0 | -15·0 | -10·25 | -20·0 | -25·0 | -21·92 | -27·0 | -32·5 | -30·6 | -34·0 | -43·0 | -37·2 | -18·00 | -35·0 | -24·75 | -46·0 | -50·25 | -47·791 | -37·0 | -40·0 | -38·00 |
| 19 | - 8·0 | -28·0 | -17·50 | -14·5 | -19·5 | -17·67 | -29·5 | -46·0 | -37·7 | -39·5 | -45·0 | -42·7 | -27·00 | -40·0 | -33·70 | -49·0 | -53·25 | -50·333 | -39·0 | -42·0 | -40·70 |
| 20 | -16·0 | -31·0 | -24·46 | -20·0 | -27·5 | -24·17 | -36·0 | -48·5 | -43·2 | -40·0 | -45·0 | -41·9 | -31·75 | -41·0 | -36·45 | -50·0 | -54·25 | -52·458 | -36·0 | -43·0 | -39·00 |
| 21 | -16·0 | -23·0 | -19·00 | -25·0 | -31·0 | -28·50 | -43·5 | -47·5 | -44·8 | -25·0 | -38·0 | -29·7 | -37·50 | -47·5 | -43·75 | -49·0 | -54·75 | -52·208 | -44·0 | -46·0 | -44·70 |
| 22 | -22·0 | -29·0 | -26·00 | -23·0 | -31·0 | -27·58 | -37·0 | -42·0 | -38·9 | -30·0 | -40·0 | -35·7 | -40·00 | -50·0 | -44·36 | -39·5 | -49·25 | -44·458 | -36·0 | -43·0 | -39·30 |
| 23 | -18·0 | -26·0 | -22·50 | -23·0 | -32·5 | -27·83 | -40·0 | -47·0 | -43·1 | -30·0 | -35·0 | -32·5 | -40·00 | -51·0 | -47·63 | -29·0 | -40·25 | -34·833 | -19·0 | -38·0 | -25·70 |
| 24 | -20·0 | -28·0 | -24·83 | -34·0 | -38·0 | -36·21 | -36·0 | -44·0 | -40·4 | -30·5 | -38·5 | -34·5 | -39·00 | -52·0 | -47·12 | -27·0 | -32·25 | -29·333 | -19·0 | -36·0 | -29·70 |
| 25 | -23·0 | -30·0 | -26·41 | -37·0 | -42·5 | -40·12 | -40·0 | -47·5 | -43·0 | -20·0 | -34·5 | -31·3 | -32·00 | -42·0 | -37·20 | -33·0 | -42·75 | -37·958 | -37·0 | -46·0 | -41·70 |
| 26 | -26·0 | -36·0 | -31·17 | -25·5 | -42·5 | -38·00 | -41·5 | -48·5 | -46·3 | -18·0 | -28·5 | -23·7 | -31·50 | -41·5 | -36·87 | -44·0 | -51·25 | -48·541 | -37·0 | -55·0 | -52·20 |
| 27 | -32·0 | -36·0 | -33·96 | -24·0 | -29·0 | -26·50 | -40·0 | -50·5 | -45·8 | -17·5 | -30·5 | -26·0 | -41·50 | -48·0 | -46·33 | -51·0 | -53·75 | -52·916 | -49·0 | -54·0 | -52·20 |
| 28 | -35·0 | -39·0 | -37·23 | -22·0 | -37·0 | -30·37 | -26·5 | -38·5 | -32·2 | -12·0 | -22·0 | -18·3 | -39·00 | -45·0 | -41·19 | -55·0 | -59·25 | -57·125 | -49·0 | -54·0 | -52·20 |
| 29 | -19·0 | -33·0 | -26·12 | -27·0 | -31·0 | -28·25 | -26·0 | -30·5 | -27·7 | -14·5 | -18·0 | -16·8 | -34·00 | -40·0 | -38·22 | -55·0 | -59·25 | -57·125 | -40·0 | -48·0 | -43·40 |
| 30 | -19·0 | -20·0 | -19·58 | -25·0 | -32·0 | -26·37 | -29·0 | -41·0 | -32·7 | -17·0 | -32·5 | -22·3 | -21·00 | -42·5 | -29·80 | -51·0 | -55·75 | -53·875 | -28·0 | -42·0 | -35·00 |
| 31 | -23·0 | -28·0 | -24·54 | -30·0 | -34·0 | -31·50 | -33·5 | -42·5 | -38·9 | -29·5 | -37·5 | -35·5 | -35·00 | -49·0 | -42·88 | -28·0 | -51·25 | -35·500 | -27·0 | -36·0 | -30·40 |
| 31 days | - 2·0 | -47·0 | -30·00 | -14·5 | -42·5 | -28·91 | - 9·5 | -50·5 | -35·7 | - 9·0 | -45·0 | -31·0 | -12·00 | -62·0 | -40·37 | -26·0 | -59·25 | -37·380 | -1[illegible] | -55·0 | -36·58 |

# FEBRUARY.

| Date. | Hecla, 1819-20, Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1824-25, Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1848-49, Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1850-51, Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1852-53, Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1853-54, Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853-54, Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Jan. 31 | -23·0 | -28·0 | -24·54 | -30·0 | -34·0 | -31·50 | -33·5 | -42·5 | -35·7 | -29·5 | -37·5 | -35·5 | -35·0 | -49·0 | -42·88 | -28·0 | -51·25 | 35·500 | -27·0 | -36·0 | -30·4 |
| Feb. 1 | 17·0 | 26·0 | 20·87 | 31·0 | 36·0 | 32·87 | 30·5 | 36·0 | 33·7 | 32·0 | 35·0 | 33·7 | 26·5 | 37·8 | 32·41 | 37·0 | 43·25 | 40·375 | 34·0 | 37·0 | 36·1 |
| 2 | 27·0 | 38·0 | 31·75 | 35·0 | 40·0 | 38·29 | 29·5 | 43·5 | 37·3 | 26·5 | 35·0 | 31·6 | 28·0 | 46·0 | 36·40 | 42·5 | 46·25 | 43·791 | 34·0 | 37·0 | 35·5 |
| 3 | 35·0 | 44·0 | 39·58 | 25·0 | 39·5 | 33·12 | 40·5 | 47·0 | 42·8 | 25·0 | 36·5 | 30·6 | 30·5 | 45·0 | 39·02 | 45·0 | 47·75 | 46·416 | 35·0 | 44·0 | 40·1 |
| 4 | 37·0 | 44·5 | 39·96 | 18·0 | 27·0 | 22·83 | 29·5 | 47·0 | 38·8 | 22·0 | 31·2 | 27·2 | 28·5 | 45·0 | 37·48 | 45·0 | 49·75 | 47·583 | 32·0 | 44·0 | 36·4 |
| 5 | 20·0 | 37·0 | 29·12 | 21·0 | 25·0 | 22·96 | 24·0 | 32·0 | 28·6 | 29·0 | 36·5 | 33·8 | 19·0 | 28·5 | 25·75 | 38·0 | 44·75 | 40·416 | 34·0 | 40·0 | 37·5 |
| 6 | 18·0 | 23·0 | 20·71 | 13·0 | 20·0 | 15·83 | 27·0 | 31·5 | 30·1 | 25·0 | 36·0 | 30·8 | 15·0 | 35·0 | 22·00 | 40·5 | 51·75 | 45·541 | 37·0 | 44·0 | 40·2 |
| 7 | 20·0 | 30·0 | 24·62 | 16·0 | 29·0 | 21·50 | 31·0 | 41·5 | 37·6 | 28·5 | 43·5 | 39·5 | 22·5 | 34·5 | 28·83 | 50·5 | 56·25 | 52·916 | 45·0 | 52·0 | 48·6 |
| 8 | 27·0 | 32·0 | 28·92 | 28·0 | 39·0 | 33·54 | 31·0 | 39·5 | 34·9 | 37·5 | 44·0 | 41·5 | 24·0 | 32·0 | 26·85 | 42·0 | 48·75 | 46·791 | 51·0 | 52·0 | 51·4 |
| 9 | 23·0 | 28·0 | 25·83 | 37·5 | 39·0 | 38·17 | 30·0 | 36·5 | 33·4 | 28·0 | 38·0 | 33·3 | 23·0 | 32·0 | 28·87 | 43·0 | 55·75 | 48·416 | 50·0 | 52·0 | 51·4 |
| 10 | 26·0 | 40·0 | 31·62 | 31·0 | 38·0 | 35·96 | 31·5 | 48·5 | 37·2 | 30·0 | 34·0 | 32·1 | 27·0 | 40·0 | 32·92 | 49·0 | 55·75 | 51·208 | 52·0 | 56·0 | 54·2 |
| 11 | 38·0 | 42·0 | 39·77 | 25·0 | 34·0 | 30·00 | 42·0 | 49·0 | 46·5 | 25·0 | 37·0 | 33·0 | 27·5 | 43·0 | 36·21 | 44·0 | 54·25 | 50·208 | 49·0 | 54·0 | 51·1 |
| 12 | 39·0 | 44·0 | 42·00 | 8·0 | 20·0 | 12·54 | 44·0 | 49·0 | 45·8 | 21·0 | 27·0 | 24·9 | 5·0 | 32·0 | 19·60 | 36·0 | 37·25 | 41·958 | 42·0 | 49·0 | 45·4 |
| 13 | 37·0 | 46·5 | 41·58 | 10·0 | 22·5 | 14·00 | 40·5 | 48·5 | 44·0 | 20·5 | 27·0 | 23·3 | 2·0 | 16·0 | 9·85 | 33·0 | 36·25 | 33·958 | 41·0 | 45·0 | 42·7 |
| 14 | 38·0 | 48·0 | 46·33 | 22·0 | 32·5 | 25·79 | 38·5 | 44·5 | 43·1 | 17·5 | 23·5 | 20·0 | 2·5 | -21·5 | 8·94 | 34·5 | 40·90 | 37·500 | 34·0 | 45·0 | 39·2 |
| 15 | 32·0 | 50·0 | 40·92 | 29·0 | 34·0 | 31·12 | 38·0 | 41·5 | 40·3 | 16·0 | 19·0 | 17·3 | 0·0 | -23·5 | 14·27 | 24·0 | 38·87 | 32·375 | 34·0 | 46·0 | 38·6 |
| 16 | 29·0 | 36·0 | 32·33 | 22·0 | 37·0 | 32·50 | 28·0 | 39·0 | 34·3 | 11·5 | 25·0 | 14·9 | - 1·0 | -32·0 | 14·42 | 28·0 | 30·87 | 25·875 | 45·0 | 55·0 | 50·4 |
| 17 | 26·0 | 39·0 | 33·42 | 15·0 | 23·0 | 18·25 | 22·0 | 29·5 | 24·9 | 26·0 | 34·0 | 30·2 | 28·0 | 34·0 | 31·00 | 29·0 | 37·37 | 33·250 | 49·0 | 55·0 | 52·0 |
| 18 | 24·0 | 28·0 | 26·25 | 26·0 | 34·0 | 28·96 | 21·5 | 24·5 | 23·0 | 27·0 | 37·5 | 32·6 | 22·5 | 36·0 | 27·00 | 28·0 | 34·05 | 30·208 | 47·0 | 52·0 | 49·7 |
| 19 | 19·0 | 24·0 | 21·04 | 27·0 | 40·0 | 33·25 | 18·0 | 22·0 | 19·8 | 34·5 | 39·0 | 36·6 | 17·0 | 22·0 | 19·70 | 34·0 | 40·37 | 37·333 | 40·0 | 51·0 | 43·0 |
| 20 | 23·0 | 26·0 | 24·08 | 37·0 | 42·0 | 39·42 | 20·0 | 34·5 | 26·2 | 35·0 | 37·5 | 36·3 | 15·0 | 21·0 | 17·08 | 40·0 | 44·00 | 41·458 | 35·0 | 43·0 | 37·8 |
| 21 | 25·0 | 37·0 | 30·25 | 35·0 | 45·0 | 40·35 | 25·0 | 35·5 | 29·9 | 35·5 | 43·0 | 39·8 | 21·5 | 44·5 | 37·54 | 35·0 | 45·00 | 40·833 | 25·0 | 43·0 | 34·7 |
| 22 | 34·0 | 41·0 | 36·58 | 29·0 | 36·0 | 31·92 | 25·0 | 33·0 | 28·6 | 34·0 | 44·0 | 38·0 | 39·0 | 45·5 | 42·38 | 30·0 | 39·25 | 34·875 | 30·0 | 39·0 | 35·2 |
| 23 | 35·0 | 41·0 | 37·67 | 25·0 | 28·0 | 26·46 | 26·5 | 46·5 | 34·5 | 39·0 | 45·0 | 42·2 | 36·0 | 43·0 | 40·75 | 34·0 | 40·50 | 37·416 | 35·0 | 41·0 | 38·7 |
| 24 | 39·0 | 43·0 | 40·92 | 25·0 | 28·5 | 26·71 | 38·5 | 57·5 | 50·2 | 42·0 | 46·0 | 44·0 | 34·0 | 40·0 | 37·56 | 36·0 | 45·00 | 40·541 | 29·0 | 37·0 | 34·6 |
| 25 | 30·0 | 38·5 | 34·54 | 27·0 | 32·0 | 30·37 | 49·5 | 60·0 | 54·6 | 30·0 | 45·5 | 37·7 | 25·0 | 41·0 | 37·00 | 39·0 | 45·62 | 41·875 | 28·0 | 37·0 | 33·3 |
| 26 | 20·0 | 29·0 | 26·33 | 8·5 | 26·0 | 17·17 | 17·0 | 50·5 | 32·2 | 29·0 | 34·0 | 31·6 | 34·0 | 42·0 | 38·02 | 37·0 | 43·62 | 40·291 | 29·0 | 35·0 | 32·5 |
| 27 | 24·0 | 32·0 | 27·75 | 8·0 | 13·0 | 10·17 | 17·5 | 30·5 | 23·2 | 37·0 | 40·0 | 38·1 | 37·0 | 47·0 | 42·00 | 30·5 | 41·00 | 36·916 | 23·0 | 27·0 | 26·2 |
| 28 | 25·0 | 32·0 | 29·08 | 9·0 | 32·0 | 20·92 | 24·5 | 35·0 | 30·2 | 31·0 | 39·5 | 35·7 | 37·0 | 42·5 | 39·02 | 20·5 | 32·50 | 26·625 | 22·0 | 27·0 | 25·6 |
| 29 | 27·0 | 37·0 | 29·07 | | | | | | | | | | | | | | | | | | |
| Mean | -17·0 | -50·0 | -32·19 | - 8·0 | -45·0 | -27·32 | -17·0 | -60·0 | -35·2 | -11·5 | -46·0 | -32·5 | 2·5 | -47·0 | -29·39 | -20·5 | -55·75 | -40·247 | -22·0 | -56·0 | -40·8 |

# MARCH.

| Date. | Hecla, 1819-20, Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1824-25, Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1848-49, Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1850-51, Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1852-53, Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1853-54, Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853-54, Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Feb. 28 | -25·0 | -32·0 | -29·08 | - 9·0 | -32·0 | -20·92 | -24·5 | -35·0 | -30·2 | -31·0 | -39·5 | 35·7 | 37·0 | 42·0 | 39·02 | 20·5 | 32·50 | 26·625 | -22·0 | -27·0 | -25·6 |
| Mar. 1 | 25·0 | 40·0 | 31·33 | 22·0 | 44·0 | 31·46 | 20·5 | 31·0 | 26·1 | 17·0 | 34·0 | 26·2 | 34·0 | 44·0 | 37·77 | 18·0 | 29·00 | 23·000 | 14·0 | 28·0 | 21·4 |
| 2 | 17·0 | 33·0 | 25·00 | 38·0 | 47·5 | 42·96 | 13·0 | 28·5 | 19·2 | 16·5 | 26·0 | 18·4 | 24·0 | 43·0 | 34·85 | 16·5 | 34·12 | 24·625 | 29·0 | 36·0 | 33·6 |
| 3 | 26·0 | 37·0 | 31·33 | 23·0 | 40·0 | 29·29 | 4·5 | 13·5 | 8·6 | 26·5 | 29·0 | 26·5 | 16·0 | 35·5 | 22·60 | 28·0 | 36·50 | 31·916 | 30·0 | 38·0 | 34·8 |
| 4 | 24·0 | 33·0 | 27·92 | 27·0 | 35·0 | 31·29 | 7·5 | 13·0 | 10·7 | 17·5 | 25·0 | 20·9 | 37·0 | 49·0 | 46·27 | 24·0 | 36·37 | 30·000 | 32·0 | 43·0 | 38·8 |
| 5 | 9·0 | 26·0 | 16·50 | 26·0 | 33·5 | 29·33 | 6·5 | 19·0 | 11·6 | 23·0 | 33·0 | 27·6 | 47·5 | 57·3 | 52·83 | 25·0 | 38·25 | 31·541 | 36·0 | 43·0 | 40·6 |
| 6 | 2·5 | - 8·0 | - 2·50 | 20·0 | 39·0 | 29·58 | 2·0 | -10·0 | - 4·0 | 31·0 | 37·0 | 34·7 | 49·5 | 55·8 | 52·29 | 31·0 | 44·00 | 38·833 | 28·0 | 44·0 | 39·7 |
| 7 | 2·0 | -15·0 | - 6·17 | 32·0 | 39·0 | -35·29 | 8·0 | - 5·5 | 1·9 | 26·0 | 36·5 | 31·2 | 48·0 | 55·5 | 51·96 | 21·0 | 44·37 | 39·708 | 24·0 | 42·0 | 32·7 |
| 8 | -16·0 | -22·0 | -18·35 | 24·0 | 33·0 | 28·37 | - 2·5 | -25·0 | -13·4 | 32·0 | 40·0 | 37·0 | 38·5 | 46·0 | 41·54 | 20·0 | 36·00 | 28·416 | 15·0 | 33·0 | 22·1 |
| 9 | 3·0 | 14·0 | 8·58 | 24·0 | 33·5 | 27·92 | -15·0 | -37·5 | -24·7 | 28·5 | 41·5 | 38·5 | 31·5 | 40·5 | 36·83 | 19·0 | 38·37 | 30·708 | 30·5 | 38·0 | 34·6 |
| 10 | 1·0 | -14·0 | - 4·96 | 22·0 | 36·5 | 30·08 | -31·5 | -40·0 | -36·4 | 28·5 | 43·0 | 35·1 | 29·5 | 40·0 | 35·08 | 30·0 | 42·25 | 35·875 | 34·0 | 42·0 | 37·4 |
| 11 | 6·0 | -11·0 | - 2·25 | 25·0 | 38·5 | 34·04 | -23·5 | -39·0 | -29·2 | 34·0 | 38·5 | 36·4 | 34·0 | 45·0 | 39·94 | 27·0 | 36·00 | 32·416 | 38·0 | 46·0 | 42·3 |
| 12 | -19·0 | -29·0 | -24·00 | 24·0 | 37·5 | 32·24 | -28·0 | 34·0 | 31·6 | 21·5 | 37·0 | 28·6 | 34·5 | 40·5 | 38·13 | 26·5 | 30·75 | 28·250 | 39·0 | 46·0 | 43·4 |
| 13 | -10·0 | -27·0 | -22·71 | 24·0 | 36·0 | 30·46 | -17·0 | 35·0 | 27·5 | 11·0 | 21·0 | 14·4 | 31·0 | 40·0 | 37·64 | 23·0 | 44·81 | 35·416 | 36·0 | 45·0 | 40·3 |
| 14 | -12·0 | -24·0 | -17·83 | 23·0 | 38·0 | 32·29 | -15·5 | -22·5 | -19·2 | 12·5 | 8·0 | 9·9 | 14·0 | 33·0 | 26·50 | 35·0 | 49·62 | 42·833 | 31·0 | 43·0 | 35·1 |
| 15 | 10·0 | 23·0 | 16·25 | 18·0 | 38·0 | 27·62 | -18·5 | -28·5 | 23·2 | 11·5 | 39·0 | 25·6 | 23·5 | 33·5 | 28·70 | 23·5 | 40·00 | 34·333 | 24·0 | 32·0 | 27·2 |
| 16 | 13·0 | 26·0 | 21·79 | 23·0 | 28·0 | 25·50 | 22·5 | 35·0 | 28·2 | 25·5 | 37·5 | 33·2 | 16·0 | 23·0 | 19·06 | 23·0 | 29·62 | 25·666 | 19·0 | 27·0 | 23·1 |
| 17 | 12·0 | 24·0 | 17·58 | 21·0 | 27·5 | 24·38 | -14·0 | -33·0 | -22·3 | 27·0 | 40·0 | 36·0 | 5·0 | -18·0 | - 8·47 | 22·5 | 31·37 | 27·916 | 20·0 | 30·0 | 25·9 |
| 18 | 5·0 | 16·0 | 8·88 | 11·0 | 29·5 | 23·04 | -18·0 | -36·5 | -25·4 | 17·0 | 37·0 | 24·6 | 21·5 | 5·5 | 14·71 | 14·0 | 24·25 | 19·416 | 30·0 | 36·0 | 31·8 |
| 19 | 10·0 | 18·0 | 13·75 | 15·5 | 25·5 | 21·50 | -29·0 | -40·5 | -35·0 | 9·0 | 16·5 | 16·8 | 14·5 | - 2·0 | 4·75 | 12·5 | 38·37 | 28·225 | 29·0 | 38·0 | 33·7 |
| 20 | 8·0 | 18·0 | 11·88 | 20·0 | 27·0 | 22·29 | -28·5 | -41·5 | -35·5 | 11·0 | 26·5 | 20·9 | 12·0 | Zero | 4·94 | 24·0 | 40·12 | 33·250 | 27·0 | 37·0 | 32·0 |
| 21 | 12·0 | 24·0 | 15·63 | 20·0 | 29·0 | 22·33 | -32·0 | -43·5 | -37·7 | 30·0 | 44·5 | 37·2 | 18·0 | 12·0 | 14·39 | 22·5 | 39·37 | 31·416 | 27·0 | 33·0 | 31·2 |
| 22 | 8·0 | 22·0 | 13·75 | 16·0 | 37·5 | 29·17 | -36·5 | -44·5 | -39·7 | 20·0 | 28·0 | 23·3 | 24·0 | 10·0 | 16·58 | 23·0 | 39·37 | 30·083 | 26·0 | 36·0 | 30·7 |
| 23 | 17·0 | 26·0 | 20·42 | 20·0 | 38·0 | 30·46 | -29·5 | -48·0 | -39·7 | 11·0 | 23·0 | 16·6 | 22·0 | 7·5 | 13·48 | 27·5 | 42·25 | 35·416 | 31·0 | 38·0 | 35·1 |
| 24 | 18·0 | 27·0 | 21·50 | 23·0 | 40·0 | 33·50 | 30·5 | 51·0 | 38·8 | 18·5 | 29·0 | 22·2 | 14·0 | 0·5 | 5·54 | 21·0 | 37·06 | 30·500 | 28·0 | 37·0 | 33·1 |
| 25 | 22·0 | 30·0 | 26·71 | 26·0 | 42·0 | 33·54 | -31·0 | -45·0 | 37·1 | 19·0 | 30·0 | 23·5 | 2·0 | -17·0 | - 8·17 | 22·5 | 43·00 | 34·708 | 32·0 | 34·0 | 33·5 |
| 26 | 21·0 | 29·0 | 25·50 | 20·0 | 29·0 | 23·92 | -13·5 | -32·5 | 21·0 | 11·0 | 26·0 | 19·0 | - 1·0 | -11·5 | - 7·60 | 23·0 | 42·00 | 32·208 | 22·0 | 37·0 | 27·7 |
| 27 | 19·0 | 33·0 | 26·17 | 9·0 | 27·0 | 18·00 | 4·0 | 13·5 | 8·5 | 20·0 | 33·0 | 25·6 | 5·0 | - 7·0 | - 2·69 | 22·5 | 46·00 | 36·125 | 27·0 | 38·0 | 32·7 |
| 28 | 16·0 | 29·0 | 24·17 | 13·0 | 32·0 | 22·75 | 7·5 | 25·0 | 14·6 | 21·5 | 35·0 | 28·4 | 6·0 | - 1·5 | 1·12 | 22·5 | 35·19 | 28·750 | 17·0 | 32·0 | 23·6 |
| 29 | 17·0 | 28·0 | 23·88 | 18·0 | 30·0 | 23·42 | 6·5 | 25·5 | 12·5 | 10·0 | 35·0 | 21·5 | - 9·0 | -15·0 | - 7·44 | 14·0 | 26·06 | 20·125 | 16·0 | 27·0 | 19·4 |
| 30 | 12·0 | 28·0 | 20·29 | 16·0 | 32·0 | 24·92 | - 0·5 | -14·0 | - 7·1 | 8·0 | 23·0 | 16·2 | 8·5 | -18·0 | - 8·58 | 13·0 | 26·00 | 19·916 | 18·0 | 28·0 | 22·7 |
| 31 | 3·0 | 27·0 | 11·50 | 21·0 | 35·0 | 28·71 | 14·0 | 25·5 | 18·8 | 21·5 | 27·5 | 25·2 | 8·0 | -13·0 | - 1·10 | 14·0 | 29·68 | 22·333 | 18·0 | 36·0 | 24·9 |
| Mean | 6·0 | -40·0 | -18·10 | - 9·0 | -47·5 | -28·37 | 8·0 | -51·0 | -22·8 | - 8·0 | -44·5 | -25·7 | 24·0 | -55·5 | -17·71 | 12·5 | 49·62 | 30·471 | -14·0 | -46·0 | -31·7 |

# APRIL.

| Date. | Hecla, 1820. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1825. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1849. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1851. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1853. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1854. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Mar. 31 | - 3·0 | -27·0 | -11·50 | -21·0 | -35·0 | -28·71 | -14·0 | -25·5 | -18·8 | -21·5 | -27·5 | -25·20 | 8·0 | -13·0 | - 1·104 | 14·0 | 29·68 | 22·333 | -18·0 | -36·0 | -24·9 |
| Apr. 1 | 0·0 | -16·0 | - 8·33 | 20·0 | 37·0 | 29·58 | 0·2 | -16·0 | - 3·5 | 19·0 | 29·0 | 24·00 | - 2·0 | -26·0 | -16·400 | 18·5 | 34·31 | 26·708 | 20·0 | 33·0 | 27·6 |
| 2 | - 2·0 | 25·0 | 8·37 | 17·0 | 36·0 | 27·75 | - 0·4 | - 5·5 | - 2·2 | 19·0 | 27·0 | 24·50 | -12·0 | -27·0 | -20·375 | 12·0 | 28·37 | 22·333 | 21·0 | 34·0 | 28·2 |
| 3 | 9·0 | 26·0 | 18·71 | 11·0 | 31·0 | 23·08 | - 4·7 | -13·4 | - 9·4 | 6·0 | 26·0 | 13·50 | Zero | -14·5 | -10·540 | 6·0 | 37·50 | 24·458 | 21·0 | 36·0 | 27·8 |
| 4 | 8·0 | 26·0 | 14·75 | 11·5 | 34·0 | 23·67 | - 3·5 | -14·2 | - 7·5 | 2·0 | 12·0 | 6·50 | 6·0 | - 8·5 | - 0·666 | 10·5 | 36·18 | 25·750 | 15·0 | 30·0 | 21·2 |
| 5 | 5·0 | 24·5 | 16·62 | 17·5 | 36·0 | 28·54 | -13·6 | -26·0 | -19·2 | 7·0 | 23·0 | 10·70 | 10·5 | - 2·0 | 2·310 | 11·5 | 23·18 | 19·375 | 10·0 | 20·0 | 13·7 |
| 6 | 15·0 | 25·0 | 18·75 | 19·0 | 36·0 | 28·25 | -14·2 | -29·4 | 22·7 | 15·0 | 25·5 | 20·80 | 13·0 | -14·0 | - 3·730 | 10·0 | 17·00 | 12·916 | 8·0 | 22·0 | 15·3 |
| 7 | 13·0 | 26·0 | 21·00 | 12·0 | 35·0 | 25·04 | - 2·2 | -29·4 | -11·5 | 4·8 | 25·0 | 11·90 | Zero | -11·0 | - 5·380 | 8·5 | 27·87 | 20·250 | 17·0 | 33·0 | 21·2 |
| 8 | 13·0 | 29·0 | 20·46 | 11·0 | 29·0 | 20·88 | 8·6 | 19·2 | 13·4 | 5·0 | 28·0 | 19·90 | - 4·0 | -24·0 | -16·350 | 15·0 | 35·12 | 25·708 | 18·0 | 34·0 | 26·5 |
| 9 | 14·0 | 30·0 | 21·85 | 9·5 | 26·0 | 16·79 | - 9·2 | -20·5 | -14·1 | 7·0 | 24·0 | 15·30 | - 8·0 | -23·0 | -17·330 | 12·5 | 29·50 | 21·500 | 12·0 | 28·0 | 16·6 |
| 10 | 12·0 | 32·0 | 22·96 | 6·0 | 19·0 | 10·67 | - 8·4 | -16·5 | -11·7 | 9·0 | 20·0 | 14·50 | - 2·0 | -21·0 | -11·440 | - 1·0 | 16·25 | 12·000 | 8·0 | 20·0 | 13·2 |
| 11 | 12·0 | 27·0 | 19·67 | 8·0 | - 5·0 | 2·46 | - 7·5 | -23·2 | -14·5 | 11·0 | 26·0 | 17·70 | 10·5 | - 5·0 | 1·480 | - 1·5 | 21·37 | 12·250 | 8·0 | 22·0 | 14·5 |
| 12 | 11·0 | 29·0 | 20·00 | 19·0 | 5·0 | 12·29 | - 2·2 | -14·8 | - 6·3 | 10·0 | 25·0 | 17·30 | 11·0 | - 3·0 | 0·830 | 6·5 | 18·12 | 12·333 | 1·0 | 22·0 | 9·9 |
| 13 | 15·0 | 31·0 | 22·92 | 4·5 | -11·0 | - 1·42 | - 7·0 | -19·2 | 13·5 | 1·0 | 11·0 | 4·20 | 9·0 | - 6·0 | - 1·600 | 2·0 | -10·00 | - 1·791 | 7·5 | 9·0 | 4·7 |
| 14 | 14·0 | 29·0 | 19·37 | - 6·0 | -14·0 | - 9·54 | - 7·6 | -18·4 | -14·5 | 7·0 | - 1·0 | - 4·40 | 7·0 | -13·0 | - 3·690 | 3·5 | 1·75 | 1·208 | - 4·0 | 17·0 | 12·2 |
| 15 | 6·0 | -17·0 | - 7·33 | - 5·0 | -14·0 | -10·42 | -13·6 | -20·2 | 16·2 | 18·0 | 5·0 | 11·70 | - 2·0 | -25·0 | -15·120 | - 1·0 | -18·25 | -10·125 | 6·0 | 19·0 | 6·8 |
| 16 | - 5·0 | -19·0 | -12·33 | 11·0 | -17·0 | - 1·83 | -10·2 | -20·4 | -15·1 | 17·0 | 14·5 | 16·00 | - 9·0 | -15·5 | -11·540 | 4·0 | - 4·00 | - 0·916 | 8·5 | 8·0 | 1·2 |
| 17 | 5·0 | 21·0 | 13·62 | 11·0 | -14·0 | - 2·92 | - 3·6 | -16·6 | -10·6 | 25·0 | 16·0 | 21·40 | -10·0 | -24·5 | -19·100 | 7·2 | - 7·00 | 2·808 | 16·0 | 2·0 | 9·8 |
| 18 | 1·0 | 15·0 | 8·17 | 9·0 | -14·5 | - 2·71 | - 3·2 | -19·4 | - 9·8 | 27·0 | 18·0 | 21·00 | Zero | -13·0 | - 8·120 | 12·5 | 5·00 | 8·666 | 16·0 | 1·5 | 8·8 |
| 19 | 2·0 | -13·0 | - 4·00 | 4·0 | -12·0 | 1·71 | -10·8 | -19·5 | -15·8 | 26·0 | 19·0 | 21·50 | - 7·0 | -17·5 | -13·500 | 4·5 | -11·00 | - 3·416 | 12·5 | 2·0 | 6·8 |
| 20 | 4·0 | - 9·0 | - 2·21 | 13·0 | 1·5 | 6·67 | 2·6 | -13·4 | - 3·8 | 28·0 | 15·0 | 21·60 | -11·0 | -16·0 | -13·900 | 12·0 | - 6·50 | 0·775 | 15·0 | 4·0 | 9·2 |
| 21 | 3·0 | -10·0 | - 3·17 | 20·0 | 3·0 | 10·87 | - 1·0 | -19·0 | 7·4 | 10·0 | -13·0 | 0·10 | - 9·0 | -23·0 | -16·400 | 13·0 | - 9·50 | 1·433 | 25·0 | 6·0 | 13·1 |
| 22 | 0·0 | -12·0 | - 4·63 | 20·0 | - 2·0 | 8·08 | -14·7 | 22·2 | 18·3 | - 9·0 | -16·0 | -12·80 | -10·0 | -18·5 | -15·080 | 15·0 | 6·50 | 9·750 | 10·0 | 1·0 | 5·3 |
| 23 | 13·0 | - 5·0 | 4·00 | 11·0 | 2·0 | 6·87 | - 7·2 | -20·4 | -13·8 | -20·0 | -26·0 | -23·00 | Zero | - 9·0 | - 6·940 | 15·0 | 2·00 | 7·791 | 6·0 | -13·0 | - 4·1 |
| 24 | 14·0 | 4·0 | 10·42 | 7·0 | 1·5 | 3·17 | - 8·2 | -14·2 | -10·2 | - 8·5 | -26·5 | -12·90 | 2·0 | -11·5 | - 5·140 | 16·0 | -12·00 | 0·375 | 9·0 | 15·0 | 4·0 |
| 25 | 14·0 | - 7·0 | 4·88 | 14·0 | 1·5 | 6·92 | - 2·8 | -12·6 | - 8·9 | 3·0 | -22·0 | - 8·10 | - 0·5 | -13·0 | - 8·540 | 15·0 | - 6·00 | 2·916 | 15·0 | 11·0 | 4·0 |
| 26 | 11·0 | -12·0 | - 1·17 | 9·0 | - 6·0 | 2·21 | 2·2 | - 4·4 | - 1·0 | - 8·0 | -22·0 | -16·90 | 2·0 | -15·5 | - 7·100 | 14·5 | - 8·50 | 3·650 | 15·0 | 8·0 | 12·5 |
| 27 | 9·0 | -12·0 | 0·08 | 12·0 | - 9·0 | 3·54 | - 2·8 | 11·8 | 6·9 | -11·0 | -29·0 | -17·30 | 7·0 | -17·0 | - 6·750 | 16·0 | 3·00 | 9·458 | 24·0 | 5·0 | 18·7 |
| 28 | 15·0 | - 5·0 | 4·83 | 11·0 | - 6·0 | 3·67 | 1·0 | 12·4 | 4·5 | -10·0 | -25·0 | -17·10 | 5·0 | - 4·5 | - 0·180 | 21·0 | 15·00 | 17·875 | 29·0 | 12·0 | 21·9 |
| 29 | 22·0 | 3·0 | 12·75 | 14·0 | - 9·0 | 0·96 | 4·8 | 0·0 | 2·6 | 1·0 | -19·0 | -10·50 | 10·0 | - 4·0 | 1·560 | 23·0 | 16·50 | 19·666 | 15·0 | 1·0 | 9·7 |
| 30 | 32·0 | 6·0 | 20·38 | 7·0 | - 2·5 | 2·21 | 7·0 | 7·6 | 1·2 | 14·0 | -26·0 | - 8·80 | 17·5 | - 6·0 | 3·500 | 20·0 | - 3·50 | 9·500 | 17·0 | - 4·0 | 8·9 |
| Mean | 32·0 | -32·0 | - 8·37 | 20·0 | -37·0 | - 6·50 | 7·0 | -29·4 | -10·1 | 28·0 | -29·0 | - 7·31 | 17·5 | -27·0 | - 8·127 | 23·0 | -37·50 | - 5·197 | 29·0 | -36·0 | - 5·4 |

# MAY.

| Date. | Hecla, 1820. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1825. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1849. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1851. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1853. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1854. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| Apr. 30 | 32·0 | 6·0 | 20·38 | 7·0 | −2·5 | 2·21 | 7·0 | −7·5 | ... | 14·0 | −26·0 | ... | 17·5 | −6·0 | 3·500 | 20·0 | − 3·5 | 9·500 | | | |
| May 1 | 17·0 | 17·0 | 8·58 | 11·0 | −5·0 | 5·12 | 4·5 | −9·0 | ... | −4·0 | −20·0 | −10·80 | 23·0 | 2·0 | 12·770 | 18·0 | −15·0 | 1·000 | | | |
| 2 | 11·0 | −1·0 | 6·25 | 11·0 | 2·5 | 5·88 | 1·0 | −4·5 | ... | −1·0 | −18·0 | − 6·40 | 14·0 | 1·0 | 7·020 | 2·5 | −14·5 | −6·500 | | | |
| 3 | 15·0 | 2·0 | 9·25 | 8·0 | 3·0 | 5·58 | 2·0 | −6·0 | ... | 10·0 | − 5·0 | 3·10 | 15·5 | −1·5 | 4·040 | 6·0 | −12·5 | −1·708 | | | |
| 4 | 16·0 | Zero | 7·67 | 15·0 | −3·0 | 4·84 | 3·0 | −3·0 | ... | 9·0 | − 1·0 | 4·10 | 7·0 | −9·0 | −1·580 | 12·0 | − 9·5 | 2·116 | | | |
| 5 | 20·0 | 2·0 | 11·58 | 11·0 | −7·5 | 3·46 | 8·0 | −1·5 | ... | 13·0 | − 4·0 | 4·80 | 8·0 | −9·0 | 0·480 | 11·0 | − 3·0 | 4·541 | | | |
| 6 | 8·5 | 2·0 | 3·83 | 26·0 | 1·5 | 13·33 | 16·0 | −3·0 | ... | 9·0 | − 8·0 | −0·40 | 10·0 | Zero | 5·590 | 8·0 | −19·0 | −5·333 | | | |
| 7 | 5·0 | 4·0 | 0·79 | 25·0 | 6·0 | 16·04 | 18·0 | 5·5 | ... | 11·0 | − 6·0 | 1·50 | 10·0 | Zero | 5·250 | 4·0 | −15·0 | −4·875 | | | |
| 8 | 8·0 | 2·0 | 3·00 | 28·0 | 11·0 | 19·25 | 17·0 | 8·0 | ... | 16·5 | − 3·0 | 8·70 | 12·0 | −1·5 | 3·930 | 8·5 | − 2·5 | 1·791 | | | |
| 9 | 9·0 | 1·0 | 4·67 | 30·0 | 13·5 | 22·29 | 28·0 | 17·5 | ... | 8·0 | − 7·0 | −1·20 | 10·5 | 2·0 | 7·750 | 12·0 | 1·0 | 5·000 | | | |
| 10 | 10·0 | 1·0 | 5·62 | 24·0 | 3·0 | 11·00 | 24·0 | 10·0 | ... | 12·0 | −13·0 | 2·50 | 12·0 | −2·5 | 6·200 | 15·0 | 1·0 | 6·166 | | | |
| 11 | 10·0 | 1·5 | 4·17 | 9·5 | 4·0 | 6·29 | 16·0 | 3·0 | ... | 17·0 | 2·0 | 9·50 | 12·5 | Zero | 5·940 | 13·0 | 2·0 | 6·500 | | | |
| 12 | 18·0 | 1·0 | 8·62 | 17·0 | 4·0 | 8·25 | 29·0 | 8·0 | ... | 8·0 | − 4·0 | 3·40 | 17·5 | 1·0 | 8·350 | 15·0 | − 3·0 | 4·958 | | | |
| 13 | 17·0 | 1·0 | 7·62 | 17·0 | 6·0 | 11·62 | 16·5 | 2·0 | ... | 12·0 | − 2·0 | 7·50 | 16·0 | −1·5 | 6·420 | 12·5 | −11·0 | 1·208 | | | |
| 14 | 17·0 | 3·0 | 7·50 | 28·5 | 1·5 | 17·75 | 24·0 | 1·0 | ... | 14·0 | 2·0 | 7·80 | 15·0 | −2·0 | 6·120 | 18·0 | Zero | 5·333 | | | |
| 15 | 19·5 | 1·0 | 9·42 | 33·0 | 15·0 | 23·27 | 29·0 | 18·5 | ... | 24·0 | 1·0 | 10·70 | 22·0 | 1·0 | 9·330 | 16·5 | −7·0 | 4·375 | | | |
| 16 | 24·0 | 2·0 | 12·67 | 23·5 | 14·5 | 18·50 | 28·0 | 20·5 | ... | 11·0 | 1·0 | 6·50 | 21·0 | 12·0 | 17·380 | 16·5 | −3·0 | 7·916 | | | |
| 17 | 29·0 | 7·0 | 18·50 | 26·0 | 17·0 | 21·96 | 37·5 | 20·0 | ... | 20·0 | − 3·0 | 3·70 | 25·0 | 14·0 | 17·230 | 20·0 | 5·0 | 13·750 | | | |
| 18 | 24·0 | 10·0 | 18·50 | 25·0 | 17·0 | 21·17 | 27·0 | 19·0 | ... | 25·0 | 10·0 | 19·70 | 28·5 | 17·0 | 21·620 | 20·0 | 2·5 | 8·816 | | | |
| 19 | 25·0 | 10·0 | 18·00 | 23·5 | 17·0 | 20·21 | 26·0 | 14·0 | ... | 17·0 | 9·0 | 12·20 | 30·0 | 16·0 | 23·290 | 17·0 | Zero | 7·791 | | | |
| 20 | 25·0 | 10·0 | 16·96 | 31·0 | 16·0 | 20·08 | 21·5 | 12·5 | ... | 15·0 | 6·0 | 10·40 | 39·0 | 19·0 | 26·760 | 18·5 | 5·0 | 10·250 | | | |
| 21 | 29·0 | 6·0 | 18·83 | 36·0 | 15·5 | 22·33 | 25·0 | 9·0 | ... | 21·0 | 6·0 | 12·50 | 38·0 | 19·0 | 25·630 | 18·0 | 9·0 | 12·875 | | | |
| 22 | 32·0 | 12·0 | 23·00 | 24·0 | 17·0 | 21·04 | 42·0 | 16·0 | ... | 17·0 | 5·0 | 11·80 | 30·0 | 19·5 | 22·870 | 17·5 | 4·0 | 11·291 | | | |
| 23 | 31·0 | 20·0 | 27·29 | 22·5 | 16·5 | 20·50 | 41·5 | 22·0 | ... | 16·5 | 4·0 | 10·00 | 33·0 | 17·0 | 22·480 | 19·0 | Zero | 18·833 | | | |
| 24 | 38·0 | 25·0 | 32·71 | 23·0 | 7·0 | 16·87 | 37·0 | 20·0 | ... | 21·5 | 4·0 | 9·90 | 29·0 | 20·0 | 24·120 | 28·5 | 6·0 | 16·041 | | | |
| 25 | 40·5 | 32·0 | 36·33 | 27·0 | 13·0 | 21·50 | 33·0 | 15·0 | ... | 18·0 | 4·0 | 12·30 | 58·0 | 28·0 | 39·480 | 30·0 | 15·0 | 21·450 | | | |
| 26 | 38·5 | 30·0 | 33·04 | 33·0 | 21·0 | 27·25 | 19·0 | 13·5 | ... | 26·0 | 17·0 | 22·30 | 25·5 | 13·0 | 17·120 | 33·5 | 16·0 | 23·583 | | | |
| 27 | 47·0 | 32·5 | 39·17 | 37·5 | 22·0 | 26·75 | 24·0 | 13·0 | ... | 19·0 | 12·0 | 15·00 | 22·0 | 14·0 | 19·000 | 23·5 | 10·0 | 18·708 | | | |
| 28 | 37·0 | 33·0 | 34·96 | 39·0 | 23·0 | 31·87 | 21·5 | 10·0 | ... | 16·0 | 11·0 | 20·20 | 30·5 | 17·5 | 21·875 | 24·0 | 9·0 | 20·375 | | | |
| 29 | 33·0 | 24·0 | 26·54 | 26·0 | 23·0 | 23·83 | 38·0 | 8·5 | ... | 24·5 | 10·0 | 18·00 | 29·5 | 17·5 | 23·560 | 24·0 | 17·0 | 22·458 | | | |
| 30 | 38·0 | 24·0 | 31·08 | 31·5 | 24·0 | 28·71 | 36·0 | 20·0 | ... | 29·5 | 14·0 | 22·00 | 32·0 | 18·0 | 23·150 | 32·0 | 19·0 | 26·375 | | | |
| 31 | 35·0 | 27·0 | 30·92 | 34·0 | 26·0 | 30·25 | 32·0 | 18·0 | ... | 37·0 | 18·0 | 26·20 | 36·0 | 23·0 | 26·660 | 33·0 | 19·0 | 26·916 | | | |
| Mean | 47·0 | −4·0 | 16·66 | 39·0 | −7·5 | 17·65 | 42·0 | −9·0 | ... | 37·0 | −20·0 | 8·96 | 58·0 | −9·0 | 14·738 | 33·5 | −19·0 | 9·419 | | | |

# JUNE.

| Date. | Hecla, 1820. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1825. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1849. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1851. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1853. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1854. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| May 31 | 35·0 | 27·0 | 30·92 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 36·0 | 23·0 | 26·66 | 33·0 | 19·0 | 29·916 | | | |
| June 1 | 40·0 | 31·0 | 36·29 | 42·0 | 26·0 | 32·46 | ... | ... | ... | 36·0 | 21·0 | 27·50 | 34·0 | 24·5 | 27·63 | 33·0 | 20·0 | 26·958 | | | |
| 2 | 36·0 | 31·0 | 34·17 | 39·0 | 25·0 | 29·92 | ... | ... | ... | 31·0 | 23·0 | 26·60 | 33·0 | 23·0 | 25·58 | 40·5 | 25·0 | 29·375 | | | |
| 3 | 43·0 | 20·0 | 35·50 | 42·5 | 23·5 | 33·46 | ... | ... | ... | 29·0 | 16·0 | 23·70 | 28·0 | 22·0 | 25·08 | 34·0 | 19·0 | 26·416 | | | |
| 4 | 39·0 | 31·5 | 35·63 | 36·0 | 25·0 | 31·83 | ... | ... | ... | 29·0 | 10·0 | 20·50 | 31·0 | 22·0 | 25·87 | 32·5 | 17·0 | 25·000 | | | |
| 5 | 40·0 | 30·0 | 34·87 | 45·0 | 25·0 | 35·29 | ... | ... | ... | 34·0 | 23·0 | 28·30 | 32·5 | 22·5 | 25·58 | 26·0 | 15·0 | 20·250 | | | |
| 6 | 37·0 | 28·0 | 32·17 | 48·0 | 27·0 | 36·67 | ... | ... | ... | 34·5 | 22·0 | 30·40 | 39·0 | 23·0 | 28·33 | 27·5 | 15·0 | 21·125 | | | |
| 7 | 31·0 | 28·0 | 29·63 | 45·0 | 32·0 | 36·29 | ... | ... | ... | 33·0 | 28·5 | 30·70 | 35·0 | 20·0 | 25·00 | 28·1 | 20·0 | 23·541 | | | |
| 8 | 36·0 | 28·0 | 32·08 | 47·0 | 33·0 | 36·86 | ... | ... | ... | 37·0 | 29·0 | 32·90 | 31·0 | 25·0 | 27·67 | 32·0 | 18·5 | 23·250 | | | |
| 9 | 38·0 | 30·0 | 33·92 | 41·5 | 32·5 | 36·42 | ... | ... | ... | 37·0 | 32·0 | 34·70 | 31·0 | 25·0 | 27·92 | 33·5 | 23·0 | 27·125 | | | |
| 10 | 33·0 | 32·0 | 32·25 | 37·0 | 31·0 | 33·79 | ... | ... | ... | 41·0 | 31·0 | 34·50 | 36·0 | 26·0 | 29·71 | 31·0 | 25·0 | 28·583 | | | |
| 11 | 36·0 | 33·0 | 33·92 | 35·0 | 30·0 | 32·50 | ... | ... | ... | 41·0 | 31·5 | 37·00 | 38·0 | 25·0 | 29·96 | 27·5 | 21·0 | 24·416 | | | |
| 12 | 34·0 | 30·0 | 32·54 | 43·0 | 31·5 | 35·25 | ... | ... | ... | 50·0 | 29·0 | 34·70 | 36·0 | 23·5 | 28·71 | 27·0 | 23·0 | 24·958 | | | |
| 13 | 37·0 | 29·5 | 33·46 | 38·0 | 30·5 | 33·96 | ... | ... | ... | 37·0 | 33·0 | 35·30 | 33·0 | 24·5 | 28·21 | 26·5 | 18·5 | 23·291 | | | |
| 14 | 37·0 | 32·0 | 34·75 | 41·5 | 27·5 | 35·21 | ... | ... | ... | 38·0 | 31·0 | 34·90 | 39·0 | 31·0 | 32·55 | 28·0 | 20·5 | 23·000 | | | |
| 15 | 39·0 | 29·0 | 34·67 | 40·0 | 23·0 | 32·92 | ... | ... | ... | 37·0 | 31·0 | 34·20 | 42·0 | 35·0 | 29·55 | 39·0 | 22·0 | 27·333 | | | |
| 16 | 37·0 | 29·0 | 33·75 | 42·0 | 34·0 | 37·96 | ... | ... | ... | 39·0 | 31·0 | 34·60 | 33·0 | 27·0 | 29·35 | 36·0 | 21·0 | 26·625 | | | |
| 17 | 43·0 | 30·0 | 34·58 | 47·0 | 33·5 | 38·83 | ... | ... | ... | 40·0 | 30·0 | 34·10 | 36·0 | 25·0 | 30·14 | 35·0 | 21·0 | 27·041 | | | |
| 18 | 43·0 | 31·0 | 37·33 | 45·0 | 32·0 | 38·25 | ... | ... | ... | 34·0 | 30·0 | 32·30 | 38·0 | 27·5 | 31·58 | 38·0 | 24·0 | 28·750 | | | |
| 19 | 40·0 | 34·0 | 37·67 | 43·0 | 32·5 | 37·58 | ... | ... | ... | 43·0 | 29·5 | 34·60 | 42·0 | 27·0 | 31·62 | 37·0 | 23·0 | 28·125 | | | |
| 20 | 39·0 | 34·0 | 36·25 | 40·5 | 33·0 | 35·92 | ... | ... | ... | 34·0 | 28·0 | 30·80 | 32·0 | 26·0 | 28·27 | 31·0 | 23·0 | 26·250 | | | |
| 21 | 42·0 | 35·0 | 38·17 | 41·0 | 34·0 | 36·54 | ... | ... | ... | 32·0 | 27·5 | 30·10 | 30·0 | 27·0 | 27·98 | 34·0 | 22·0 | 25·791 | | | |
| 22 | 51·0 | 36·0 | 44·33 | 44·0 | 35·0 | 38·17 | ... | ... | ... | 39·0 | 26·0 | 33·10 | 34·0 | 29·5 | 30·46 | 42·0 | 25·0 | 32·250 | | | |
| 23 | 46·5 | 38·0 | 42·08 | 44·0 | 36·0 | 39·50 | ... | ... | ... | 52·0 | 28·0 | 35·70 | 34·0 | 30·0 | 31·06 | 44·0 | 25·0 | 35·458 | | | |
| 24 | 41·0 | 33·0 | 37·00 | 41·0 | 34·0 | 38·25 | ... | ... | ... | 43·0 | 27·0 | 31·40 | 40·0 | 30·0 | 34·21 | 38·0 | 25·0 | 32·000 | | | |
| 25 | 41·5 | 34·0 | 37·42 | 42·0 | 32·5 | 37·29 | ... | ... | ... | 37·0 | 28·0 | 32·10 | 41·0 | 30·5 | 34·08 | 37·0 | 26·0 | 31·208 | | | |
| 26 | 47·0 | 33·0 | 40·50 | 43·0 | 32·0 | 37·42 | ... | ... | ... | 35·0 | 32·0 | 33·10 | 38·0 | 31·5 | 34·83 | 44·0 | 29·0 | 33·833 | | | |
| 27 | 43·0 | 36·0 | 39·33 | 45·0 | 38·0 | 41·50 | ... | ... | ... | 35·0 | 32·0 | 33·70 | 37·5 | 31·0 | 35·00 | 42·0 | 31·0 | 34·250 | | | |
| 28 | 44·0 | 32·0 | 37·17 | 41·0 | 36·0 | 39·25 | ... | ... | ... | 41·0 | 30·0 | 35·70 | 37·0 | 30·0 | 32·48 | 38·0 | 28·0 | 32·250 | | | |
| 29 | 46·0 | 39·0 | 41·92 | 42·0 | 35·0 | 37·87 | ... | ... | ... | 43·0 | 33·0 | 35·50 | 34·0 | 29·5 | 31·64 | 42·0 | 32·0 | 36·416 | | | |
| 30 | 48·0 | 37·0 | 43·75 | 42·0 | 35·0 | 36·42 | ... | ... | ... | 40·0 | 33·0 | 35·50 | 42·0 | 30·0 | 35·42 | 36·0 | 31·0 | 33·333 | | | |
| Mean | 51·0 | 28·0 | 36·24 | 47·0 | 23·0 | 36·12 | ... | ... | ... | 52·0 | 10·0 | 32·27 | 42·0 | 20·0 | 29·84 | 44·0 | 15·0 | 27·940 | | | |

# JULY.

| Date. | Hecla, 1820. Melville Island, 74° 47′ N., 111° 0′ W. | | | Hecla, 1825. Port Bowen, 73° 14′ N., 89° 0′ W. | | | Enterprise, 1849. Port Leopold, 73° 51′ N., 90° 18′ W. | | | Resolute, 1851. Griffith Island, 74° 40′ N., 95° 0′ W. | | | Assistance, 1853. Northumberland Sound, 76° 52′ N., 97° 0′ W. | | | Assistance, 1854. Wellington Channel, 75° 31′ N., 92° 0′ W. | | | Resolute, 1853. Melville Island, 75° 0′ N., 109° 0′ W. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. | Max. | Min. | Mean. |
| June 30 | 48·0 | 37·0 | 43·75 | 42·0 | 35·0 | 36·42 | ... | ... | ... | 40·0 | 33·0 | 35·50 | 42·0 | 30·0 | 35·42 | 36·0 | 31·0 | 33·333 | | | |
| July 1 | 41·0 | 36·0 | 40·58 | 42·0 | 34·0 | 37·58 | ... | ... | ... | 38·0 | 31·0 | 34·90 | 43·0 | 32·0 | 35·79 | 39·0 | 32·0 | 35·500 | | | |
| 2 | 45·0 | 36·0 | 40·50 | 41·5 | 34·0 | 37·00 | ... | ... | ... | 37·0 | 31·0 | 33·30 | 41·0 | 32·0 | 35·92 | 42·0 | 34·0 | 37·166 | | | |
| 3 | 53·0 | 34·0 | 43·83 | 43·0 | 33·0 | 37·76 | ... | ... | ... | 37·5 | 32·0 | 35·00 | 39·0 | 30·0 | 34·42 | 38·0 | 33·0 | 36·208 | | | |
| 4 | 45·0 | 37·0 | 39·83 | 37·0 | 34·0 | 34·92 | ... | ... | ... | 39·0 | 33·0 | 36·10 | 38·0 | 34·0 | 36·08 | 40·0 | 35·0 | 36·958 | | | |
| 5 | 52·3 | 37·0 | 44·33 | 38·0 | 32·0 | 35·20 | ... | ... | ... | 40·0 | 32·0 | 35·80 | ... | ... | ... | 43·0 | 37·0 | 38·833 | | | |
| 6 | 51·0 | 43·0 | 47·67 | 40·5 | 34·0 | 36·25 | ... | ... | ... | 40·0 | 32·0 | 36·40 | ... | ... | ... | 43·0 | 37·0 | 40·250 | | | |
| 7 | 55·0 | 41·0 | 47·42 | 43·0 | 32·0 | 37·67 | ... | ... | ... | 47·0 | 32·0 | 39·00 | ... | ... | ... | 43·0 | 33·0 | 36·583 | | | |
| 8 | 55·0 | 43·0 | 48·75 | 41·0 | 33·0 | 35·58 | ... | ... | ... | 43·0 | 33·0 | 37·00 | ... | ... | ... | 37·0 | 32·0 | 34·666 | | | |
| 9 | 49·0 | 40·0 | 43·58 | 41·0 | 34·0 | 36·50 | ... | ... | ... | 36·0 | 31·0 | 33·50 | ... | ... | ... | 37·0 | 33·0 | 34·583 | | | |
| 10 | 48·0 | 41·0 | 45·67 | 41·0 | 33·0 | 37·92 | ... | ... | ... | 40·5 | 31·0 | 34·30 | ... | ... | ... | 41·0 | 35·0 | 37·583 | | | |
| 11 | 49·0 | 43·0 | 43·33 | 41·0 | 35·0 | 38·12 | ... | ... | ... | 42·5 | 34·0 | 37·40 | ... | ... | ... | 41·0 | 33·0 | 37·666 | | | |
| 12 | 49·0 | 40·0 | 43·75 | 44·0 | 37·0 | 40·08 | ... | ... | ... | 41·0 | 37·0 | 39·00 | | | | | | | | | |
| 13 | 55·0 | 40·0 | 46·00 | 47·5 | 37·0 | 41·17 | ... | ... | ... | 49·0 | 37·0 | 42·20 | | | | | | | | | |
| 14 | 56·0 | 32·0 | 48·25 | 40·5 | 32·0 | 37·08 | ... | ... | ... | 45·0 | 36·0 | 39·30 | | | | | | | | | |
| 15 | Left Winter Quarters. | | | | | | | | | | | | | | | | | | | | |
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# ACCOUNT OF THE FISH.

BY

SIR JOHN RICHARDSON, C.B., F.R.S.,

HON. F.R.S.ED., ETC. ETC. ETC.

THE small collection of fish brought from Wellington Sound by Sir Edward Belcher is interesting from the locality in which it was formed,—high in respect of latitude, at a considerable distance from the Greenland shores, and still further removed from Behring's Straits. The families to which the specimens belong are among the characteristic forms of the northern seas, and their members are remarkable for their strong generic physiognomy, and consequently for the difficulty that naturalists experience in framing concise and distinctive phrases for the discrimination of the species.

The first group that we have to notice, the *Cottidæ*, sufficiently illustrate this remark. So strong is the family aspect of these small and familiar fish, that in the early progress of ichthyology the *Cottus gobio* and *C. scorpius* were supposed to be inhabitants of all the waters of the northern hemisphere. More minute observation has shown differences in specimens from distant localities; and we are now perhaps in danger of running into the opposite extreme, of unduly restricting the geographical ranges while we augment the numbers of the species. Fabricius, who until lately has been almost the sole authority for Greenland fish, describes three *Cotti* besides the *Cottus cataphractus*, which is the type of the genus

*Aspidophorus* of Lacépède and Cuvier. Another Greenland species (*Cottus porosus*) is added in the 'Histoire des Poissons' (t. viii.); and Professor Reinhardt, of Copenhagen, notices two others, *Cottus uncinatus* and *Triglops Pingelii*. Kroyer (Nat. Tidskr. N. Räkk.) subdivided the northern *Cotti*, making the *Cottus tricuspis* of Reinhardt, identified with *C. gobio* of Fabricius, the type of his genus *Phobetor*, which wants vomerine teeth, while his genus *Icelus* has palatine teeth, in addition to the dentition of the vomer and jaws. To it belong *Cottus uncinatus* and *C. bicornis* of Reinhardt, and a Spitzbergen species, *Icelus hamatus* (Kroyer). Mr. Girard, in a Monograph published in the 'Smithsonian Contributions to Knowledge, December, 1850,' has carried the dismemberment of Artedi's genus *Cottus* still further. To the marine species he has given the name of *Acanthocottus*, reserving the original generic appellation to the *Cottus gobio* and its numerous allies, inhabitants of fresh waters. The American species of *Cottus*, as restricted by Mr. Girard, are,—1. *C. cognatus* (Richardson), an inhabitant of Great Bear Lake, under the Arctic circle; 2. *C. Richardsonii* (Agassiz), taken on the northern coasts of Lake Superior; 3. *C. Franklinii* (Agassiz), frequenting the southern shores of the same great lake; 4. *C. Alvordii* (Girard), Fort Gratiot, Lake Huron; 5. *C. formosus* (Girard), Lake Ontario; 6. *C. gracilis* (Heckel, or *Uranidea quiescens* of Dekay), New England and New York; 7. *C. gobioides* (Girard), Lake Champlain; 8. *C. boleoides* (Girard), Vermont; 9. *C. Bairdii* (Girard), Mahoning River, Ohio; 10. *C. Wilsoni* (Girard), eastern tributaries of the Ohio; 11. *C. viscosus* (Haldeman), Eastern Pennsylvania and Maryland; 12. *C. meridionalis* (Girard), James River, Virginia.

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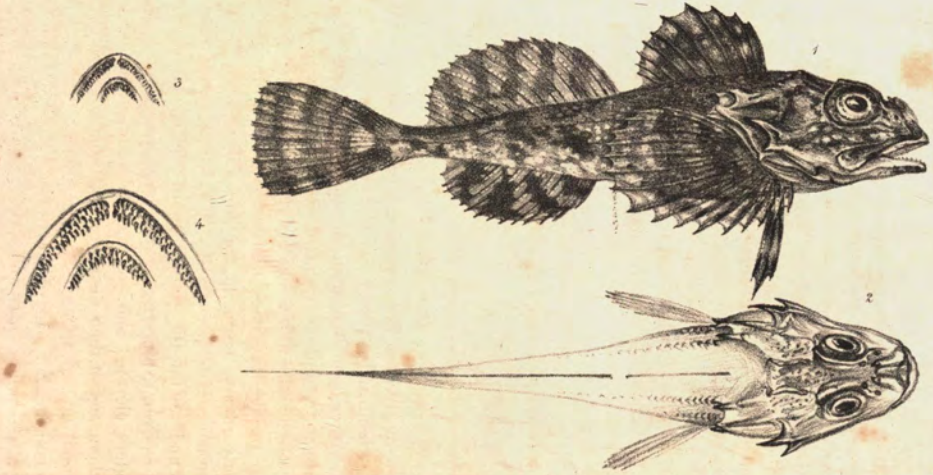
I avail myself of this opportunity to remove a nominal species from the list of American fish. The *Cottus hexacornis* (Richardson) was found at the mouth of the Coppermine River in June, 1821, on Sir John Franklin's First Expedition; and a description of the recent fish was entered in my note-book at the time, but the specimens were lost during the calamitous

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retreat of the Expedition from the coast. In writing out the Natural History Report, after my return to England, I misconstrued my brief record of the nasal spines, and by considering them to be similar to the cranial tubercles, made a fictitious discrepancy with the characters of the common *Cottus quadricornis* of the northern seas. On revisiting the same coasts in 1849 I obtained more specimens and discovered my error; and, on a comparison of them with examples of the *C. quadricornis* in the British Museum, I found that, except in the greater size of the *hexacornis* and the more fully developed cranial tubercles, the species was the same. In the fish of Coronation Gulf the tubercles are not larger than those represented in the portrait of an Iceland specimen published in Gaimard's Atlas.

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## COTTUS GLACIALIS (Richardson).

*Radii:* Br. 6; D. 10/~17; C. 15; A. 14; V. 1/3; P. 17.

PLATE XXIV., figs. 1, 2, 3, nat. size; fig. 4, magnified.

### *Description.*

The general aspect of this species approaches that of *Cottus gobio* of England, and is dissimilar to that of *C. scorpio*. *Head* broad and rather depressed, with an obtuse snout: its length is contained thrice and nearly a half in the total length of the fish, while its breadth at the occiput rather exceeds its height there. In profile, the back descends from the hind head without any gibbous rising at the first dorsal, such as that which characterizes *C. porosus* (C. et V. viii. p. 498). Body tapering, and tail at the setting on of the caudal slender. *Armature:*—Nasal spines moderately large, pungent. Superorbital ridges elevated and even, including a smooth furrow between them, and of their distal corners forming the anterior pair of small cranial tubercles. Immediately behind these tubercles rise another pair of ridges, scarcely so prominent, bounding a less hollow space and terminating in the posterior pair of still smaller tubercles. These four tubercles have little

prominence, being much enveloped in the skin, and are neither rough nor spinous: their plan is represented in Plate II. fig. 2.

Preoperculum emitting the principal spine from the point where it is supported by the smooth rib of the second suborbitar. This spine is subulate and acute, rises above the axis of the fish at an angle of 45°, and does not reach to the edge of the gill-cover: from its base a shorter spine inclines slightly below the axis, and the proximal end of the preoperculum tapers so as to form a third small and bluntish spine, which stands just behind the angle of the lower jaw and has an inclination forwards and downwards; it is enveloped in loose integument. There are no other prominent points on the preoperculum. The bony operculum consists of a horizontal narrow piece or rib that tapers into a spine, whose point does not attain the membranous edge of the gill-cover, and of a slender descending limb, which joins a corresponding process of the suboperculum splintwise. Between the disc of the suboperculum and the main limb of the operculum there is a triangular fleshy space, and just behind the inferior preopercular spine the suboperculum emits a small pungent spine, directed downwards.* A moderate-sized suprascapular spine lies parallel to the opercular one and immediately over it, completing the armature of the head.

The fins are rather large; their position may be ascertained by referring to fig. 1, wherein they are represented fully extended. All the rays of the anal and second dorsal are jointed. *Anus* placed under the third ray of the second dorsal.

*Lateral line* constructed, as in *C. porosus*, of a series of short cutaneous tubes, elevated above the skin, open at the

* M. Valenciennes describes a spine as occupying nearly this position in *C. porosus*, but as belonging to the operculum. "L'opercule donne, comme à l'ordinaire, une épine de son angle supérieur; elle est courte et ne dépasse pas le bord membraneux; mais il en donne une autre très-pointue, de son angle inférieur près de sous-opercule."—C. et V. viii. p. 499.

end, and having above and below them smaller pores, seemingly connected with the main line by tubular branchlets. The inferior row of marks in fig. 2 represent short cutaneous folds, corresponding to the points of the ribs. There are no scales nor bony plates on any parts of the skin.

The *body* is clouded, as represented in the figure, with bars on the fins; and there are many small white spots, just perceptible to the naked eye, scattered over the sides. A lens shows the dark places to be marked with crowded black dots. No teeth on the palate bones.

*Dimensions.*

| | |
|---|---|
| Total length, including caudal | 4·45 inches. |
| Length of head to tip of operculum | 1·30 |
| Length from premaxillary (retracted) to anus | 1·80 |
| Breadth of head at gill openings | 0·70 |
| Height of head there | 0·62 |

This fish was taken in Northumberland Sound, in lat. 76° 53′ N., in nine fathoms water, on a gravelly bottom, the temperature of the air being at the time of capture 28° Fahr.

I have endeavoured to obtain specimens of the *Cottus polaris* of Sabine, discovered in abundance on the shores of North Georgia in pools of water left by the ebbing tide; but the search that was instituted, at my request, in the Museum of the Zoological Society and in the British Museum was without success. It appears however to be sufficiently characterized as distinct from *C. glacialis* by the small number of rays in the dorsals (6/–13), and the five rays in the ventrals, though in other respects there is no marked discrepancy between Colonel Sabine's description and the above of *glacialis*.

In many particulars *C. porosus* of M. Valenciennes, brought from Davis's Straits, answers to our fish, and but for the spine in the second dorsal, the inferior opercular spine, and especially the gibbous back particularized in his description, I should have considered them to be one species. I have seen neither figure nor specimen of *C. porosus*.

## PHOBETOR TRICUSPIS (Kroyer).

*Genus* PHOBETOR, Kroyer, Naturhistorisk Tidskrift udgivet Henrik Kroyer, Kjöbenhavn, 1844–45. (*Caret dentibus vomerinis, cæteroquin Cotti simile.*)

*Cottus gobio*, Fabricius, Fauna Grœnlandica, No. 115, p. 159, an. 1780.

*Cottus tricuspis*, Reinhardt, Mus. Reg., et Graah, Reise Ostk. Grönl., 1832, p. 194; Reinhardt, Det Kongelige Danske Videnskabernes Selskabs, Kjöbenhavn, p. 52, An. 1832, et Ichthyologiske Bidrag til den Grönlandske Fauna af J. Reinhardt, Kjöbenhavn, An. 1837, No. 3, p. 35.

*Phobetor tricuspis*, Kroyer, *ut supra cit.*; Reports on Ichthyol. for 1843–44, Ray Soc., pub. 1847, p. 555.

*Cottus Fabricii*, Girard, Monograph in Smithsonian Contrib., Dec. 1851, No. 13, p. 59.

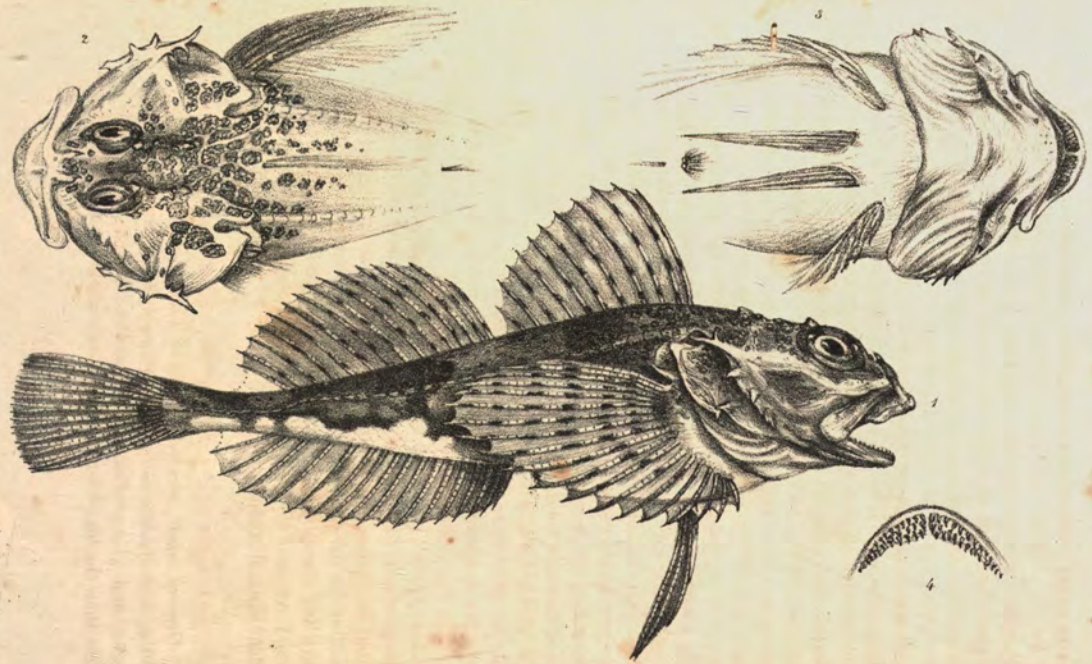
*Tricuspis*, Gaimard, Voy. en Scandinavie, Ichth. par Kroyer, pl. iv. (No letter-press.)

*Radii:* Br. 6–6; D. 11/–15; C. 11⅔; A. 17; V. 1/3; P. 19.*

PLATE XXIII., fig. 1–4, nat. size.

The Danish naturalists, who have the best means of knowing the fish described by Fabricius, have identified his *gobio* with the *tricuspis* of Professor Reinhardt. I have not however been able to obtain a detailed account of the species by any late writer, the above citations being in general brief remarks on the description in the 'Fauna Grœnlandica,' said by them to be imperfect. This description generally corresponds with our fish, but there are some parts of it which would have led me to consider the Greenland one a different species, were it not for Kroyer's figure above quoted, which, though evidently a bad drawing, is yet so like our Plate I. in essential characters, that it would be unsafe to name them as distinct species. The doubts raised by the consideration of Fabricius's account arise first from his applying the word *ha-*

* In the Fauna Grœnland. the numbers are: B. 6; D. 10/–17; C. 12; A. 18; V. 3; P. 17; and in Kroyer's figure, D. 11/–16; C. 11; A. 18.

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*matus* to the preopercular spine, which is not hooked, though it may be said to be barbed, like an Eskimo fishing-hook or fish-spear; secondly, as to the extent to which the scabrous osseous scales are distributed. According to him they form the lateral line, or run along it, and in some individuals exist also under the pectorals and behind the eyes. In our specimen these scales cover the top of the head and nape, and spread less densely to the gill-cover: but the lateral line is beset by none, except just at its commencement. It is most likely a very variable character, depending partly or wholly on sex and season. Thirdly, he describes the first dorsal and pectorals as black, with pale lines; whereas in our fish the fine lines which cross the rays of these fins are black, the membrane being pale. The figure in the 'Voyage en Scandinavie' shows no scabrous scales at all, but the preopercular spine corresponds with our Plate, as does also the distribution of the dark parts of the body, the fins however being darker. As Kroyer could compare Gaimard's Iceland specimens with the Greenland ones in the Royal Museum of Copenhagen, we must consider their identity as established with the one we have figured, and which was captured in Hudson's Bay. The species is therefore spread widely through the northern seas, and is very plentiful at Spitzbergen, as well as on the Greenland coasts.

Its generic name of *Phobetor* (*φοβητρον, quod metum incutit*) has reference to the dread that fishermen entertain of wounds from its spines. It wants the vomerine teeth of *Cottus*, as well as the palatine ones of *Icelus*, having only the premaxillary and mandibular ones, and it has no opercular spine. The size likewise of its pectorals and of its fins generally is greater than is usual among the *Cotti*.

### *Description.*

*General aspect*, much like that of *Cottus scorpius* or *C. bubalis*, with lively colours, larger fins, rather more protractile jaws, and a somewhat smaller mouth. Length of the head less than the breadth at the preopercula, and equalling a third

of the total length of the fish, caudal included. The greatest height of the head is fully one-third less than its breadth; that part of the fish may be described therefore as depressed, and when viewed from above, the outline of the entire head is broadly ovate, while the body tapers regularly to the slender tail (fig. 2).

In profile, though the premaxillaries appear, from their slenderness and greater protrusion, more acute than is usual in the *Cotti*, the face from the eyes forward is obtuse: the curve of the dorsal line however is moderate and regular, its summit being under the first dorsal, and the descent to the orbits gentle.

*Armature of the head.*—Nasal spines acute, conspicuous. The strongest and most peculiar spine arises from the angle of the preoperculum, where that bone is supported by the unarmed, smooth second suborbitar; it tapers and is subulate, and acute at the tip, which does not quite reach the margin of the gill membrane. Two small, acute snags, rise vertically from its upper side, the distal one being the largest of the two. Three short but conspicuous spinous points, standing at equal distances, belong to the lower limb of the preoperculum, two of them, directed downwards, being acute, and the third, which is concave, and forms the proximal apex of the bone, tending forwards; two conspicuous pores perforate the upper limb of the preoperculum, as represented in figure 2. The operculum differs from that of the *Cotti* in wanting both rib and spine, its apex being a thin obtuse plate of bone, covered by and edged in the recent fish with membrane. The suboperculum has however, as in many *Cotti*, a small spine pointing downwards from its lower angle, and the distal end of the interoperculum emits a still smaller spine, directed towards the tail, across the subopercular one. I have not noticed this interopercular spine in any of the *Cotti*. The suprascapular is unarmed, though the blunt angle of the bone may be detected on searching, but the coracoid emits a minute spine from its distal edge above the pectoral fin. No orbital ridges exist, their usual site in the *Cotti* being filled in this fish by the

membrane of the eyes, but the space between the orbits is as usual concave. The postorbital tubercle on each side is small but conspicuous, and the occipital pair also exist, though they are not so isolated from the surrounding parts. All the four are finely furrowed, and through a lens appear cancellated, but are scarcely rough to the touch. The ridges connecting these tubercles are low, and enclose a slightly concave space, which, with the ridges themselves, is thickly covered by scabrous bony plates. Similar plates of different sizes exist on the gill-covers, temples, nape, and fore-part of the back, as represented in figure 2: there is also a row of smaller ones between the second dorsal and lateral line. The belly is soft and smooth throughout.

The *lateral line* is composed of a series of short, soft, raised tubes, and runs along the upper third of the back until it comes opposite to the last rays of the second dorsal and anal, when it makes a short deflection, and is continued through the middle of the remainder of the tail.

*Fins* in general large. The pectoral has much spread, an obliquely oval form when expanded, and reaches over the anterior third of the anal. From the seventh downwards the rays shorten rapidly, the lowest one having only about a sixth of the length of the longest ones. The *first dorsal*, commencing over the middle of the operculum, has its last ray over the anus: a short space divides it from the *second dorsal*, which is slightly higher, and has no spinous ray. The *anal* is also destitute of a spine, has shorter rays than the second dorsal, and goes a little nearer to the caudal. The spread of the caudal, as in the *Cotti*, is not great, though its rays are tolerably long. Three longish unbranched but jointed rays, and a spine of half their length, constitute the ventrals, whose tips go a little past the anus.

The lively colours of the recent fish have perished in the specimen after two years' maceration in spirits. The under surfaces of the head, body, and tail, are milk-white. We are indebted for the specimen to Dr. Rae, who caught it in the northern part of Hudson's Bay.

*Dimensions.*

| | |
|---|---|
| Total length of fish, caudal included | 5·60 inches. |
| Length from symphysis of premaxillaries to upper angle of gill-opening | 1·50 |
| Length from symphysis to tip of great preopercular spine | 1·20 |
| Length from symphysis to anus | 2·51 |
| Length of pectorals | 1·50 |
| Length of ventrals | 1·10 |
| Length of caudal | 0·84 |

## GASTEROSTEUS INSCULPTUS.

(*An varietas, an species propria?*)

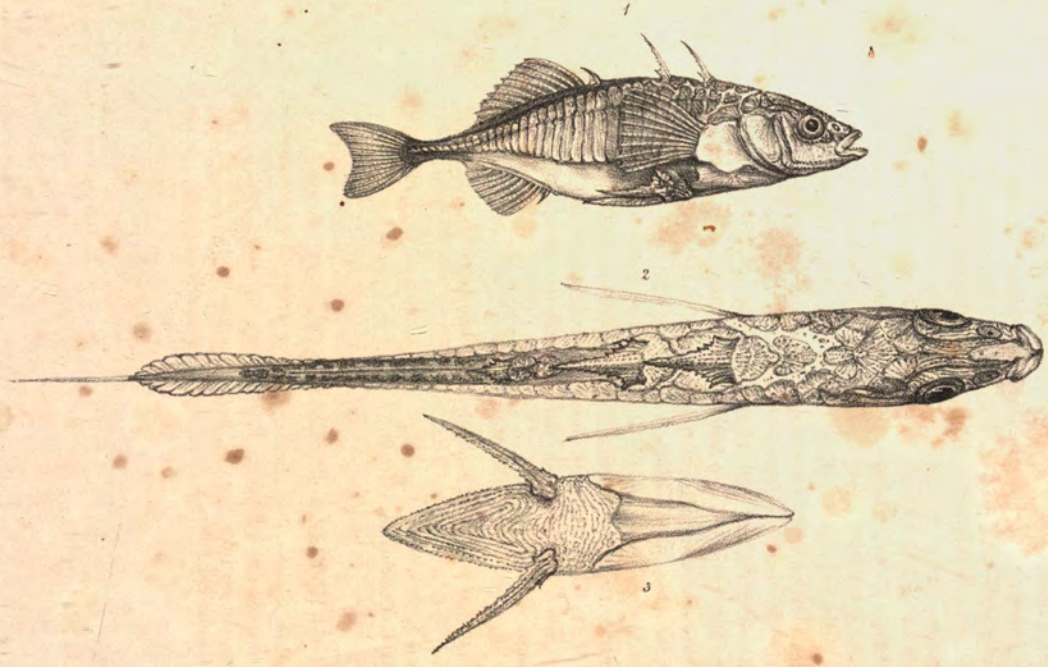
*Radii:* Br. 3–3; D. 1/–1/–1/9; A. 1/8; C. $12\frac{6}{6}$; P. 11; V. 1/1–1/1.

PLATE XXV., fig. 1, nat. size; fig. 2 and 3, magnified.

The three-spined Sticklebacks are generally spread over the northern hemisphere, being inhabitants of both the fresh and salt waters. On a cursory inspection it might appear to be a single species that is thus widely distributed, so well is the general aspect preserved in even distant localities; but Cuvier has named several forms as distinct, separating first one in which the posterior side scales are deficient, and secondly another with shorter spines. He has also described as peculiar two American species, which differ but slightly from their European representatives, and a minute comparison of specimens taken in places much less remote from each other, might discover differences sufficient greatly to multiply these species or varieties. Sir Edward Belcher has brought home a single specimen of that form, which possesses the complete number of side-plates and dorsal spines of the usual length, but which has a decidedly deeper body than its English representative: he obtained it in deep water in Northumberland Sound, at a distance from any fresh-water streams.

*Description.*

Having through the kindness of Dr. Baikie procured seven or eight three-spined *Gasterostei* from the Orkneys, some of them even larger than the Northumberland Sound one, I selected




Vincent Brooks Imp

for comparison one of exactly the same length with the latter, and placing them side by side, the greater depth of the Arctic fish was very apparent, but the only other differences I could detect consisted in the sculpturing of the opercular pieces and bony plates. In the Orkney fish the opercular bones are rayed by fine furrows or rows of dots, depressed below a smooth, silvery surface, and their edges are nearly smooth. In the Northumberland Sound one, the rays are more strongly marked, and the preoperculum especially is ribbed with rough points, which, under a lens, give a finely denticulated edge to that bone, and also to the cheek plate. The nacry plate at the base of the pectoral is the same in all. On the pelvic bones and spines the sculpturing is much coarser in the Arctic fish, but the free dorsal spines and fins differ little. One of the Orkney specimens has the tip of the second dorsal spine more toothed, as well as dilated by two thin edges; but the other specimens from the same locality have merely subulate tips to that spine. The Orkney and Hampshire specimens have one pectoral ray fewer. Some minute differences may be detected in the forms of the dorsal plates, which it would be difficult to make clear by a verbal description, for which I have therefore substituted a figure enlarged to twice the linear dimensions of the specimen.

Hampshire specimens appear smoother than the Orkney one, but I have not been able to obtain any of equal size for comparison.

*Dimensions.*

| | |
|---|---|
| Total length from tip of lower jaw to tip of caudal . . | 3·40 inches. |
| From tip of mandible to gill-opening . . . . . | 1·30 |
| From tip of mandible to anus . . . . . | 1·91 |
| Height of body at the ventrals . . . . . | 0·74 |

## GUNNELLUS FASCIATUS (Bloch, *sub Blennio*).

*Blennius fasciatus*, Bloch, Schn., p. 165, *et* pl. 37, fig. 1.

*Blennius gunnellus*, Fabricius, Fauna Grœnl., p. 149.

*Gunnellus fasciatus*, C. et V. ii. p. 441; Reinhardt, Bidrag til den Grönlandske Fauna, p. 40.

*Gunnellus Grœnlandicus*, Reinhardt, C. et V. ii. p. 442, pl. 340.

*Radii:* Br. 5–5; D. 88; C. 19; V. 44 *vel* 45; P. 13; V. 1.

PLATE XXVII., nat. size.

Bloch stated that his *fasciatus* came from Tranquebar, and Professor Reinhardt, finding the *Blennius gunnellus* of Fabricius to differ in some respects from Bloch's description and figure of *fasciatus*, gave it the name of *Grœnlandicus*, at the same time expressing doubts of the correctness of the habitat assigned by Bloch to his fish. For the same reasons the two specific names were retained in the 'Histoire des Poissons,' but Professor Reinhardt having in 1831 discovered Bloch's specimen in the Museum at Berlin, found it to be of the same species as that described by Fabricius, and therefore restored Bloch's name of *fasciatus*, which has the priority.

The Northumberland Sound specimen, figured of the natural size in Plate V., agrees in species with the *Grœnlandicus* of Cuvier, as may be seen by comparing our plate with that in the 'Histoire des Poissons.' It is fully described in the text of that work, and we need not therefore enter into details here. In the character of its markings it has a resemblance to the *Gunnellus vulgaris*, so abundant on the Lincolnshire coast; both have cross bands, though the ground tints differ. There is also a difference in the dorsal spots, which in *vulgaris* are smaller, neater, round and black, and more exactly defined by a pale border. In this species also the two minute ventrals are distinct from one another, while in *fasciatus* a single minute papilla represents both* (fig. 2).

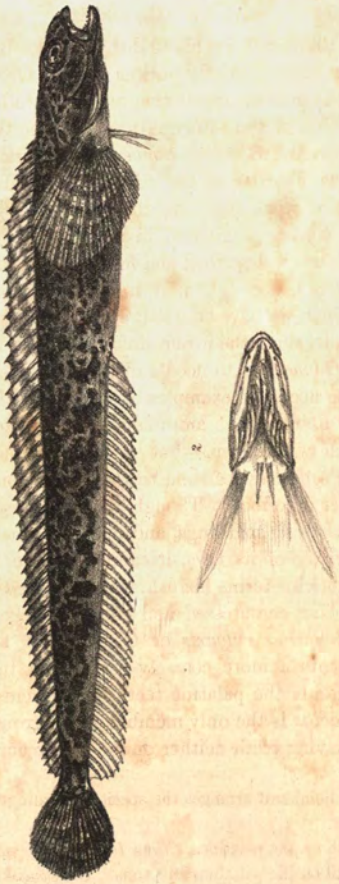
*Dimensions.*

| | |
|---|---|
| Total length | 8·16 inches. |
| Length to gill-opening | 0·78 |
| Length to anus | 4·10 |
| Greatest height just before anus | 0·90 |

* On slitting up the skin round the ventral of *fasciatus* only a single, minute, elastic, round, subulate process was found, in which the rays, if any, could not be made out.

Vincent Brooks Imp

Plate XXVIII.



## LUMPENUS NUBILUS (Richardson).

*Radii:* Br. 6–6; D. 63/; A. 1/42; C. 17; P. 16; V. 1/4–1/4.

PLATE XXVIII., nat. size.

Professor Reinhardt, in his 'Ichthyologiske Bidrag til den Grönlandske Fauna,' briefly notices several Greenland *Gunnelli*, under the generic appellation of *Clinus*, following in this a former edition of the 'Règne Animal.' The typical species of the group is the *Blennius lumpenus* of Fabricius, which is the *Gunnellus Fabricii* of the 'Histoire des Poissons,' the authors of that work rejecting the epithet *lumpenus* on account of its having originated in an erroneous compilation. The same species is described and figured in Henrik Kroyer's 'Scandinaviens Fiske' (pl. xiv.) under the generic name of *Lumpenus*, which we have adopted, notwithstanding the objection made to it, since the group differs so much from the ribbon-formed *Gunnelli* as to need a distinctive appellation.

Not having access to examples of the *Lumpeni* enumerated by Professor Reinhardt, I am unable to compare Sir Edward Belcher's fish with them,—but a careful consideration of the Professor's notices lead me to the conclusion that it is a species not yet described. Though it greatly resembles *Lumpenus Fabricii* in its markings, and does not much differ from it in the number of its rays, it cannot be said to be round (*teres*), as Fabricius terms his fish, while, on the other hand, it is far from being compressed and comparatively high in the body, like *Gunnellus vulgaris* or *G. fasciatus*, and Kroyer's figure represents a more coarsely scaled fish than *nubilus*: moreover it wants the palatine teeth of Fabricius's *lumpenus*. Indeed *L. gracilis* is the only member of the group with which it agrees in having teeth neither on the vomer nor palatines;*

* Professor Reinhardt arranges the species according to their dentition, thus:—

*a.* Teeth on the palatines, *Clinus lumpenus*, *C. medius*.

*b.* Teeth on the palatines and vomer, *C. aculeatus*.

*c.* No teeth in either of these positions, *C. gracilis*.

but these two fish differ so much in the number of their fin-rays that they cannot well be brought into the same species.

*Description.*

*Form.*—Body compressed, but not nearly so much so as that of *G. vulgaris* or *fasciatus*,—the depth, excluding the dorsal, being so much less, that where it is greatest it does not exceed one-eleventh of the total length, caudal included, while in *fasciatus* the height is one-ninth of the length. The body is thicker than the head, and both back and belly are rounded anterior to the vent, the compression increasing rapidly in the tail.

*Scales* very small, round, so deeply imbedded as not to be readily seen, but numerous on the body, and more crowded on the tail. *Lateral line* straight, running at midheight, and consisting of a fine groove. It does not readily catch the eye, and has been omitted by the artist in the figure. No scales on the fins.

*Teeth.*—A series of acicular teeth arm the orifice of the mouth, standing rather widely on both jaws. On the premaxillaries there is, in addition, an interior band of very minute villiform ones, and near the symphysis of the mandible there is a cluster two or three deep. No forked tongue is perceptible, nor is there any projection from the hyoid bone meriting the name of tongue. No teeth exist on the vomer or palate bones. There is a small velum behind the premaxillaries. A small point of the gill-plate projects over the gill opening.

The gill opening is carried forward underneath (fig. 2), the *gill membranes* being inserted far forward between the limbs of the mandible into a very narrow isthmus, instead of crossing the throat immediately before the ventrals, and having a free edge, as in *G. vulgaris* and *fasciatus*. From these *nubilus* differs also in having six branchiostegous rays on each side, cylindrical, curved, and graduated.

*Fins.*—The fin membranes generally are more delicate than those of *G. vulgaris* and its near allies, not being enveloped in thick, but in translucent integument, so that the rays are

conspicuous: the dorsal and anal are received into grooves, and when lowered into them are invisible. Owing to the elasticity of the membrane these fins are not easily kept extended unless carefully pinned out, and on that account the rays are not readily reckoned. From that cause, the artist has represented too few rays in the dorsal of fig. 1, a mistake having been made in the enumeration. All the dorsal rays are spinous, the anterior ones being graduated,—and the first anal ray is simple, and either spinous or with obsolete joints. Both fins terminate near the caudal, but are scarcely joined to its base. The caudal has a slight tendency to the rhomboidal form, with the upper and under corners rounded off. Pectoral large, but falling more than its own length short of the arms. Ventrals small, slender, and pointed, composed of a short spine and two jointed rays, visible enough, with two others, very slender and shorter, looking like a single ray fissured to the base. All lie side by side, enveloped in a thickish white skin, without any intervening extensible membrane.

*Markings.*—Head and body mottled with a row of about twelve larger, irregular marks along the middle of the side, touching or passing over the lateral line: a series of oblique, faint, and ill-defined bars on the generally pale ground of the dorsal; better defined cross bars on the pectoral; anal pale; caudal obscurely barred. There are no traces of lines parallel to the lateral line, such as Professor Reinhardt mentions in his notice of *Clinus unimaculatus*. The want of eyed spots in the dorsal, and the lateral line continued to the caudal, distinguishes *nubilus* at first sight from *G. punctatus*: how far it differs from M. Pylaie's Newfoundland *Gunnellus*, mentioned in the 'Histoire des Poissons,' I am unable to say from the briefness of the notice.

*Dimensions.*

| | |
|---|---|
| Total length, caudal included | 5·60 inches. |
| From tip of maxillary symphysis to point of gill-flap | 0·82 |
| From tip of maxillary symphysis to anus | 2·15 |
| Height of head at the gill-plates | 0·42 |
| Width there | 0·32 |

| | |
|---|---|
| Height at the middle of the belly | 0·51 inches. |
| Thickness | 0·29 |
| Length of caudal | 0·50 |
| Length of pectorals | 0·66 |
| Length of ventrals | 0·32 |

## LYCODES MUCOSUS (Richardson).

*Genus* LYCODES, Reinhardt; Th. Λυκωδης (*lupo similis*).

*Lycodes mucosus:* PLATE XXVI., fig. 1–5, nat. size.

*Radii:* Br. 6–6; D. 84; C. 10; A. 64; V. 3; P. 18.

Professor Reinhardt became acquainted with this generic form in the year 1831, on examining a specimen taken from the stomach of a shark at Nennortalik, on the coast of West Greenland, in 60° of north latitude. Subsequently he obtained other examples from Fiskerness, lying under the sixty-third parallel; and in his 'Ichthyologiske Bidrag og Tillæg til den Grönlandske Fauna,' published at Copenhagen in 1837, he gave a detailed account of three species, viz. *Lycodes Vahlii, L. reticulatus,* and *L. seminudus,* with figures of the first two.* These three species are more or less scaly, but *Lycodes mucosus* has no scales whatever: in this respect it agrees with the *Blennius polaris* obtained on the coast of North Georgia near the seventy-fifth parallel of latitude, during Sir Edward Parry's First Expedition. Captain (now Colonel) Sabine does not enter into sufficient details to enable us to characterize *polaris,* but says enough to render it probable that it enters into the genus *Lycodes,* and if so it agrees with *mucosus* in being destitute of scales.† Through the kindness

* Kroyer in his 'Scandinaviens Fiske' figures a *Lycodes perspicillum* which has a white spot close behind each eye and nine dark bands crossing the body: there are two varieties, which differ in the forms of the bands.

† The following abstract of Colonel Sabine's note contains the most essential particulars that he notices:—*Blennius polaris, imberbis, pinna anali caudali dorsalique unitis.* Length of the pectoral fin exceeding twice its breadth, having fifteen rays; ventral fins of two spines

of Dr. Gray search has been made both in the British Museum and in the collections of the Zoological Society for the specimens of this fish, but unfortunately in vain. The notices of *Blennius polaris* given in the subjoined foot-note show that it can scarcely be the same species with our *mucosus*, the markings of the two being very distinct.

*Description*

*of a female specimen of* L. mucosus.

In *general appearance* this fish has a considerable resemblance to the *Zoarces viviparus*, especially when both are enveloped in the thick mucus which they throw out copiously in dying. The head constitutes very nearly one-fourth of the total length of the fish, and its breadth just behind the eyes, where it is greatest, exceeds its height there by about one-third. The back equals the head in breadth, and the belly is more or less tumid according to its contents; but from the vent to the tip of the tail the compression is such that the distal half of the fish resembles the point of a straight sword. The anus is exactly in the middle of the total length, its border is tumid, and a small papilla projects from behind it.

*Mandible* shorter than the upper jaw. Orifice of the mouth tolerably large, but the cleft does not extend so far as the eye. A skinny lip borders the upper jaw, being attached to the premaxillaries. The mandibular lip is developed into a lobe on each side, but is wanting at the symphysis. A row of subulate teeth exists on the premaxillaries, mandible, and palatines: the row is double in front of the upper and lower jaws, and there is a round cluster on the vomer. The numbers and positions of the teeth are shown in figs. 4 and 5.

enclosed in a lax skin; upper jaw considerably longer than the under one, teeth conspicuous to the naked eye; no scales were detected by the microscope. Colour, a yellowish ground, lighter on the belly, with eleven large saddle-shaped markings across the back, the middle of these markings being much lighter than their edges, the whole back and sides marbled. No spots on the dorsal fin similar to those of *Blennius ocellatus*.

The roof of the *mouth* is furnished with acute longitudinal plaits of membrane, whose edges are set with soft, round papillæ. The upper and lower pharyngeals are armed with brush-like teeth, curved backwards, and the rakers of the branchial arches are round, sessile knobs, in two rows on each arch, also rough with minute teeth.

*Lateral nostril* on each side, forming a tubular projection close to the premaxillary: the mesial one is an open orifice like a pore. (See fig. 2.) There are many small mucous pores round the nostrils, and on the head and fore parts of the body, some of which are represented in the same figure. Eyes placed nearer to the end of the snout than to the gill-opening, and so high as to encroach on the profile of the face. Gill-opening a vertical lateral slit; the membrane of the throat being continuous with that of the belly without any transverse fold or flap of the branchiostegous membrane. A row of open pores marks the limbs of the mandible. (See fig. 3.) The rudimentary ventrals are attached to the os hyoides between the lower angles of the gill-openings.

The *lateral line*, composed of open pores, descends from the suprascapular region behind the pectoral, keeping while in the ventral region nearly in the middle of the height, but running lower from the anus backwards; it cannot be traced quite to the middle point between the anus and the tip of the tail.

There are no *scales*. To be certain on this point, I carefully skinned a specimen of which I purposed to prepare the skeleton, and having dried the skin on glass, examined it with the microscope, without discovering any trace of a scale. This character alone is sufficient to distinguish it from the three members of the genus made known by Professor Reinhardt. It may therefore prove to be the type of a distinct division of the genus to which the *Blennius polaris* of Sabine, should it hereafter be rediscovered, may be found to belong.

*Fins*.—The pectorals when fully spread out have a broadly ovate form, approaching to the orbicular: their rays are branched at the tips. Owing to the thickness of the rather

lax skin, the rays of none of the fins can be accurately enumerated, but the numbers given at the beginning of this article were taken from the skeleton of a larger specimen than the one we have figured. The vertical fins unite at the point of the tail without any break or depression, such as that which the dorsal of *Zoarces viviparus* exhibits posteriorly, and all the rays are articulated. They number in the aggregate 158, and the major part of the dorsal and anal ones are simple at the bottom and split at the tips, the divisions lying in close contact; towards the caudal the tips open a little, and the last rays are divided to the base; the caudal rays are smaller and more divided. The ten rays enumerated as caudal ones are those only which are attached to the two triangular interspinous bones, which do not terminate the spinal column evenly, but lie beneath its tip. Reinhardt describes the ventrals of his species as formed of four rays; but on a careful examination with the microscope I can detect only three torulose, jointed, tapering rays of equal length, with a minute cartilaginous support to the inner or anterior of the three. In preparing the skeleton, this part of the fish was unfortunately injured, but a dissection of one of the ventrals of the remaining specimen enabled me to ascertain its structure. When enveloped in the skin, the ventrals have considerable elasticity, and hence they may readily be confounded with spines.

*Colour.*—No memorandum was furnished to me of the tints of colour of the recent fish. The specimen that the figure was executed from was in a perfect condition, and does not appear as if any of its markings have been obliterated. It was probably put into spirits while yet alive, as its head was thrown back, as if it had died convulsed, and its body was covered by a thick layer of mucus. After twelve months' maceration in spirits the dark upper parts of the fish have a deep clove-brown colour, becoming almost black where it touches the white marks. The white extends over the lips, the under surface of the head, base of the pectoral, over the belly, and, with interruptions, along the base of much of the anal fin.

There is a small white spot on each suprascapular, one on the pectoral, and five cross bars, irregular and interrupted, on the dorsal and sides, with a spot or two on the interspaces. These white marks are not alike on both sides of the fish, and are likely therefore to vary considerably in different individuals.

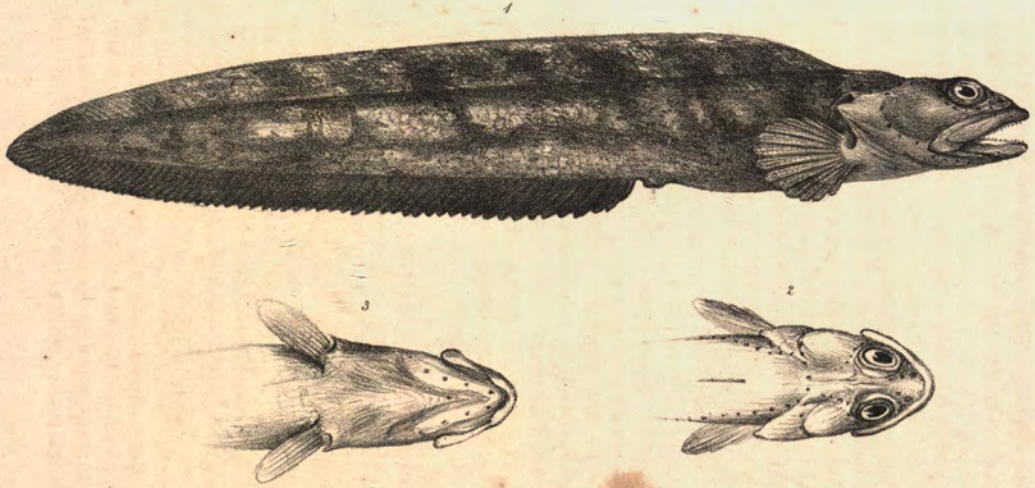
### *Osteology.*

The larger specimen, whose skeleton has furnished the following particulars, was blanched, probably from having lain exposed on the ice or beach, but some markings similar to those described above could be made out.

The vertebræ are in the whole column 92, of which 26 are abdominal. The parapophyses of the three next the cranium are not developed, but are conspicuous enough in the others, though short throughout the abdomen; they lengthen much in the caudals, and bend down to form the hæmal spines. The ribs, round and slender, are not long, and there is a short subulate appendage springing from the end of each parapophysis. The neural and hæmal spines are longest at the beginning of the anal, and shorten gradually as they approach the tip of the tail. Skull perfectly flat on the top, without crests, but with some irregular depressions on the supratemporal and suprascapular angles. Opercular pieces thin and unarmed; infra orbitars indistinct and membranous; branchiostegous rays round, tapering and curved, and rather long.

### *Dimensions.*

| | Spec. 1. | Spec. 2. |
|---|---|---|
| Length from premaxillary symphysis to edge of gill-opening | 1·7 in. | 2·4 in. |
| Length from ditto to vent | 3·5 | 5·5 |
| Length from vent to tip of caudal | 3·5 | 5·5 |
| Total length | 7·0 | 11·0 |
| Height of head at the nape | 0·8 | 1·0 |
| Height of body at middle of pectorals | 1·2 | 1·5 |
| Breadth of head at the preopercula | 1·1 | |
| Length of pectorals | 1·0 | 1·5 |


1
3
2

This fish was obtained in Northumberland Sound. It feeds on small crustaceans, fragments of many being found in its stomach.

*Alimentary Canal.*—Coats of the part which descends from the pharynx for about an inch and a quarter thick and strong, the lining membrane being disposed in acute longitudinal folds studded with coarse *villi*. The rest of the stomach is of greater diameter, bends on one side on the descending branch and bulges largely on the other, producing an obtuse sac. The pylorus is much contracted, and is surrounded interiorly by a narrow fold, acting as a valve against the regurgitation of the contents of the intestine. Immediately beneath it are the orifices of two small, wide and short, almost globular, cæca, one on each side. The coats of the remainder of the intestine are delicate, with a villous interior membrane. This portion of the canal makes two doublings. Posterior to its anal extremity is the urinary bladder, which has strong coats, and is about three-quarters of an inch long. Adjoining to it is the ovary, containing many ova.

The specimens were procured in Northumberland Sound, as were all the others of Sir Edward Belcher's collection.

## GYMNELIS VIRIDIS (Reinhardt).

Ordo *Anacanthini*, Müller.

*Ophidium viride*, Fabricius, Fauna Grœnland., p. 141, No. 99; Ross (Sir Jas.), Suppl. Parry's Third Voyage, p. 110.

*Gymnelis viridis*, Reinhardt, Ichth. Bidrag til den Grönland. Fauna, Kjöbenhavn, 1837, No. 53, p. 49. Idem, Beretningen an det Kongl. Videnskabernes Selskabs Forhandlinger, 1830 og 1833.

*Radii:* Br. 6–6; D. A. C. unitæ 164; P. 13?

PLATE XXIX., nat. size.

In the 'Règne Animal,' Cuvier informs us that he was unacquainted with the *Ophidium viride* of Fabricius, but that he believed it to be allied to the eels. The erroneousness of this opinion was pointed out by Professor Reinhardt, who had

access to many Greenland examples of the fish, and a cursory examination is sufficient to show that it has neither the coalescent parts of the nasal vertebra, which is one characteristic of the eels, nor their peculiar branchiostegous rays. In very many particulars of its structure *Gymnelis* approaches closely to *Lycodes* or *Zoarces*, but the German naturalists place it in Müller's order of *Anacanthini*. In the works above quoted Professor Reinhardt promises to give, in a future communication, a detailed account of the genus and species; but if he has executed his design, I have not been able to find the work in our London libraries. In the absence of such details and of authentic examples of the Greenland fish for comparison, I cannot be certain of the specific identity of Sir Edward Belcher's specimen, and there is some doubt even as to the number of its fin-rays. These cannot be accurately counted through the thick integument, and I designed to make a skeleton of the specimen after it had been drawn; but though the external form of the fish was well preserved by immersion in spirits, the thick mucus which covers the skin had prevented the fluid from arresting the progress of decay in the interior; whence it followed, that after a brief maceration in water, the whole fell to pieces and the rays split up, so that an accurate enumeration was impossible. The numbers of those in the three vertical fins are however a pretty close approximation. Reinhardt reckons ninety-seven in the dorsal to the point of the tail, and seventy-one in the anal, the rays of the caudal being divided between these numbers, which added together make 168, or four more than I was able to reckon in Sir Edward Belcher's specimen.

The *Ophidium Parrii* of Sir James Ross must be very unlike *viride*, in having a much larger head, whose length is equal to one-third of that of the body, and in the great size of the pectoral fins, which when spread out extend beyond the vent and completely cover the whole of the belly and throat. The vertical fins also have much fewer rays, being only fifty on the dorsal side to the point of the tail, and forty-five on the anal side. Indeed the dissimilarity is enough to raise a doubt even

in regard to the genus. I have tried in vain to find a specimen of it in our public museums.

*Description of* G. viridis.

*Form.*—Much like that of an eel. Head roundish; body slightly compressed, its width being little less than its height, and the back narrower than the belly, which is tumid; beyond the anus the compression gradually increases, so that the tail resembles the blade of an acute-pointed two-edged sword. The length of the head is contained five times and a half in the total length of the fish. Nostrils piercing the side of the snout close to the premaxillary, one of each pair being shortly tubular. Mouth at the extremity of the head, but the mandible is just perceptibly longer than the premaxillary. A single row of small *teeth* exists on both these bones, the rows being doubled irregularly close to the symphyses above and below. There is also a row of minute palatine teeth, but none on the vomer. The teeth are short and slender, but not very acute, and are not crowded except at the symphyses; they number about eighteen on each premaxillary and limb of the mandible, and about half as many on each palatine.

*Eyes* small, very much nearer to the tip of the snout than to the gill-opening, and separated from each other by a narrow smooth space, which appears depressed, owing to the eyeballs swelling above the profile of the forehead. No spinous points exist on the head.

*Gill-openings* small, and descending no lower than to the upper ray of the pectorals. A small triangular apex of the gill-flap projecting across the opening cuts off, towards the temples, a rounded portion, as may be noticed in Plate VII. fig. 1, and better as to form in Plate VIII. The skin connecting the limbs of the mandible and covering the branchiostegous rays is evenly continuous with that of the belly, without forming any transverse fold or free edge between the gill-openings, such as exists in *Gunnellus*.

*Branchiostegous rays* six, round, tapering and curved, pretty large and readily seen.

*Skin* scaleless, smooth to the touch, and very loosely attached to the muscles. When narrowly inspected it exhibits a vast number of very fine vertical, rough-looking lines, with smooth intermediate spaces, that are scarcely discernible by the unassisted eye. These lines appear to be minute folds due to the action of subcutaneous muscles, for no traces of them appear in the stretched skin when placed under a microscope: the magnified integuments appear then to be studded throughout with innumerable small, round, glandular bodies.

The *lateral line* runs below the middle height of the body to which it descends gradually from the suprascapulars, and is composed of distant minute, open pores, which disappear a little beyond the anus.

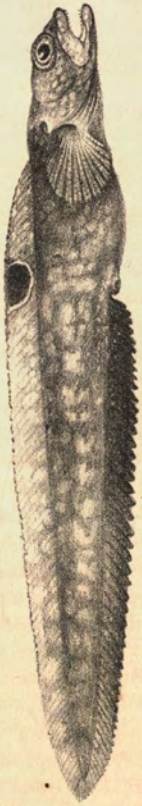
*Fins.*—Small skinny lobes surmount the tips of the anal rays, and similar though less conspicuous ones terminate the lower rays of the pectorals; and they also exist, though more indistinctly and smaller, on the dorsal. The rays of the pectorals are branched at the tips; those of the dorsal are fissured, the first one alone being simple, taper, and shorter than the following ones, without evident joints. The first three anal rays are small, but, like all the rest, distinctly jointed. At the extremity of the spinal column the short slender rays which represent the caudal are curved down, so as to form, as it were, the last anal rays. Whether this peculiar structure belong to the species, or is an accidental variety, or merely the result of injury, I cannot determine, having seen only one specimen. In the following fish, considered to be a variety by Kroyer, the rays at the extremity of the tail are straight.

The *skull* is moderately convex transversely, without prominent ridges, and increases in transverse diameter towards the occiput, which is shelving. There are twenty-two abdominal vertebræ and seventy-one caudal ones. The ribs are very small, being shorter as well as much more slender than the parapophyses.

*Dimensions.*

| | |
|---|---|
| Total length | 6·7 inches. |
| From premaxillary symphysis to anus | 2·5 |

Plate XXX.



| | |
|---|---|
| Length of head to gill-opening | 1·2 inches. |
| Width of ditto | 0·52 |

## GYMNELIS VIRIDIS, var. UNIMACULATUS.

G. *subconcolor, ocello unico nigro prope initium pinnæ dorsalis.*

*Radii:* B. 6–6; D. 95; A. 70; C. 8; P. 12; V. 0.

PLATE XXX., fig. 1, 2, nat. size.

This fish has such a general resemblance to the figure of *Ophidium stigma* of Bennet, published in the Zoological Appendix to Captain Beechey's Voyage to the Pacific (p. 67, pl. xx. fig. 1), that I was inclined to consider it to be the same species, until I observed that Dr. Collie mentions "very small scales" as existing on his fish. A single specimen only of *stigma* was procured in Kotzebue Sound. Mr. Lay's sketch, from which the figure was engraved, is said to have been slight, and neither his notes nor Dr. Collie's are sufficiently detailed on the more essential points to render even the genus certain. The specimen we have figured was obtained by Sir Edward Belcher, in Northumberland Sound, and is so like *Gymnelis viridis* in its general form and structure, that I readily follow the example of Kroyer and treat it as a mere variety. This author, in the ichthyological plates of Gaimard's Voyage to Scandinavia, represents three varieties of *Gymnelis viridis* (pl. xv.). Fig. *a* is the portrait of an individual having a row of four small eyed spots on the base of the dorsal, one of them over the anus, two before it, and two still lesser ones behind it. Fig. *b* has a single spot nearly in the situation of that shown in our Plate VIII., and fig. *c* is without spots on the dorsal, but has about twelve transverse, pale, irregular bars on the body, of which the fifth is over the anus.

The integuments of the fins are rather more delicate in our *unimaculatus* than in the specimen figured in Plate VII., which is to be attributed perhaps to its greater youth. Each ray of the proximal portion of the anal has a small lobe at its point

formed of the integument, but near the caudal the rays are smaller and more crowded, so that these cutaneous lobes become obsolete. There are smaller and less distinctly formed tips on the dorsal, and in that fin likewise the posterior rays are more slender and more closely approximated. Generally the rays are simple, tapering, and jointed, the most distal ones being however divided at the tips.

The caudal rays are direct, parallel to one another as well as to the axis of the fish; slender, short, touching each other, and occupying so little space as not to interfere with the acuteness of the tail: they are inserted into the terminal base of a triangular interspinous bone, whose apex is attached to the last vertebra. The numbers of rays given at the beginning of the article were ascertained after repeated trials, and are correct, as regards the vertical fins, within two or three of the whole number, the slender rays near the caudal occasioning doubt to that extent. The rays of the caudal itself are easily counted by aid of the lens, and there is little difficulty with the pectorals. Skin as in the preceding species; the pores are less conspicuous, but seem to be similarly situated to those of the spotless variety represented in Plate VII.

Length of *head* contained rather more than six times in the total length, and distant rather more than its own length from the anus. The latter orifice is placed exactly at the end of the first third of the whole fish. The eyes are two of their own diameters removed from the tip of the gill-cover, and approach within one diameter of the tip of the snout.

*Dimensions.*

| | |
|---|---|
| Total length | 5·10 inches. |
| From premaxillary symphysis to tip of gill-cover, mouth closed | 0·81 |
| From ditto to anus | 1·70 |
| Length of pectoral | 0·40 |
| Height of head at the nape | 0·40 |
| Breadth at ditto | 0·40 |

## MERLANGUS POLARIS (Leech).

*Merlangus polaris*, Sabine, App. Parry's First Voyage, p. ccxi.; Ross (Sir James Clark), App. Parry's Third Voyage, p. 110.

RADII.

| | | | | | |
|---|---|---|---|---|---|
| B. 7–7; | D. 12–15–19=46; | A. 17–21=38; | C. 45; | P. 19; | V. 6* |
| „ | 13–14–19=46; | 16–23=39; | 45; | 19; | 6† |
| „ | 14–16–19=49; | 17–22=39; | 42; | 18; | 6‡ |
| „ | 13–15–20=48; | 17–21=38; | 42 to 48; | 18; | 6§ |

This species was discovered on Sir John Ross's first voyage to Baffin's Bay, and was named by Dr. Leach, but was first published by Colonel Sabine, who describes a specimen that was taken by a net when swimming on the surface of Baffin's Bay, on Sir Edward Parry's first voyage in search of a North-west Passage. Sir James Clark Ross also mentions this fish in the Appendix to Parry's Third Voyage, and there states that it is abundant in all the Arctic seas that had been visited by the North-west Expeditions up to that time. The specimens that form the subjects of the present notice were obtained by Sir Edward Belcher in Northumberland Sound, being the most northerly position in which the fish has been taken. It was seen in great numbers in Parry's second voyage, in the Duke of York's Bay, north of Southampton Island, and Sir James Ross informs us that it is the principal food, in certain seasons, of numerous sea-fowl. When hotly pursued by the *beluga*, or white whale, it has been observed, in its endeavours to escape, to leap by hundreds on the ice: the members of the Expedition profited by this circumstance, and by its being frequently left by the ebbing tide in quantities in rocky pools, to obtain several excellent meals.

Sir Edward Belcher's specimens appear to be young, and the species may, for anything we know, attain a considerable size, in which case there must be some change in its external

* Belcher, pale specimen.
† Ditto, dark specimen.
‡ Sabine.
§ Ross, average.

appearance. It approaches *Merlangus virens* in the numbers of its fin-rays, but if the figure in Mr. Yarrell's excellent work on British Fishes be a correct representation of that fish, the resemblance between the species is not close.

*Description.*

*Form*, in general, much like that of an ill-conditioned haddock (*Morrhua æglefinus*). The head forms one-fourth of the total length of the fish, being proportionately longer than that of the cole fish (*M. carbonarius*), which *polaris* resembles in colour. Nearly a third of the length of the head is occupied by the large eye. At the occiput the fish is moderately compressed, the thickness there being one-third less than the height. In the specimens the bellies are shrunk, but were the intestines full of food the abdomen would most likely be prominent, as is usual in the *Gadi*. Under the first dorsal the body is highest, and there the height is equal to twice the thickness. Towards the tail the compression gradually increases.

The mouth is cleft as far back as the anterior third of the orbit; the under jaw is a little the longest. A single row of minute acicular teeth, rather widely set, arms the premaxillaries and mandible; some of them are rather taller than the others. On the chevron of the vomer the teeth are short, rather stoutly subulate and curved, and stand also in a single series. There are no teeth on the palate bones.

The lateral line is straight, without any arched curve behind the pectoral, but with a slight deflection from the suprascapular region. Small, soft, round, silvery scales cover the surface of the body, being deeply imbedded in the skin, and not becoming detached so readily as those of *M. carbonarius*. The whole skin of the head and body is minutely speckled with round, black dots, equably dispersed; the upper parts have a dark grey general tint, and the ventrals and anal fins are white.

*Fins.*—In having naked spaces separating the several fins of the back and also the two of the belly this fish resembles the

cole fish, but the spaces are larger than even in that species. All the back fins are highest in front, at the second or third ray, and gradually lower in an even line to the last ray, which is very short in all. The first dorsal therefore has not the conical form of *M. virens*, as represented in Yarrell's figure. The second dorsal is the highest of the three, and the third occupies more of the dorsal line than the others. The anals are moderately arched in outline, and the second exceeds the first in the numbers of its rays more than in the other *Merlangi*. The pectorals are narrow and pointed, and the ventrals end in a long hair-like tip, the second ray being the longest. Caudal deeply and acutely notched at the end, with acute lobes. The following comparative table is drawn up to exhibit the differences in the fin-rays of various *Merlangi*:—

| | Dorsal fins. | Anal fins. | |
|---|---|---|---|
| *M. polaris* . . | 13–15–19 = 47 ; | 17–22 = 39 | Mean of different authors. |
| *M. vulgaris* . | 13–19–18 = 50 ; | 31–20 = 51 | Yarrell. |
| *M. carbonarius* | 11–20–20 = 51 ; | 24–19 = 43 | Yarrell. |
| *M. pollachius* . | 12–19–15 = 46 ; | 24–16 = 40 | Yarrell. |
| *M. virens* . . | 13–20–19 = 52 ; | 24–20 = 44 | Linnæus. |
| *M. virens* . . | 13–20–19 = 52 ; | 26–22 = 48 | Reinhardt. |

Sir James Ross took the trouble to count the rays of many examples of *polaris*, and found considerable variety in the numbers. The quotation from him at the beginning of this article gives the means of his reckoning.

*Dimensions.*

| | Pale species. | Dark species. |
|---|---|---|
| Length from premaxillary to tip of caudal | 4·60 in. | 4·90 in. |
| Length from premaxillary to anus . . . | 2·00 | 2·12 |
| Length from premaxillary to gill-opening . | 1·15 | 1·20 |
| Width at occiput . . . . . | 0·45 | 0·50 |
| Height behind the eyes . . . . . | 0·65 | 0·75 |
| Diameter of the eye . . . . . | 0·30 | 0·33 |

The *Merlangus carbonarius* and *M. virens* are likewise inhabitants of Davis's Strait, and another species was noticed by

Colonel Sabine in Winter Harbour, Melville Island, but the specimens he obtained were so much decayed that he does not venture to say whether they belonged to the genus *Merlangus* or to *Morrhua*. In the hinder mandibular teeth being tricuspid it seems to be peculiar, and differs widely from *polaris*. He enumerates the fin-rays as follows:—*Radii*: D. 13–19–20; A. 20–20; C. 40; P. 18; V. 6. These numbers approach nearest to those of *polaris*.

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## EXPLANATION OF THE PLATES.

PLATE XXIII. PHOBETOR TRICUSPIS.—Fig. 1, profile; 2, upper view of head; 3, under view of head; 4, premaxillary teeth:—all of the natural size.

PLATE XXIV. COTTUS GLACIALIS.—Fig. 1, profile; 2, plan of dorsal aspect; 3, teeth of premaxillaries and vomer:—all these of the natural size. Fig. 4, teeth of the upper jaw, magnified.

PLATE XXV. GASTEROSTEUS INSCULPTUS.—Fig. 1, profile, natural size. Fig. 2, dorsal aspect, magnified to twice its linear dimensions. Fig. 3, pelvic bones, much enlarged.

PLATE XXVI. LYCODES MUCOSUS.—Fig. 1, profile; 2, top of the head; 3, under aspect of the head; 4, roof of the mouth; 5, mandible:—all of the natural size.

PLATE XXVII. GUNNELLUS FASCIATUS.—Fig. 1, profile; 2, under surface of head and throat:—natural size.

PLATE XXVIII. LUMPENUS NUBILUS.—Fig. 1, profile; 2, under surface of the head and throat:—natural size.

PLATE XXIX. GYMNELIS VIRIDIS.—Fig. 1, profile; 2, top of the head; 3, under aspect of the head:—natural size.

PLATE XXX. GYMNELIS VIRIDIS, var. *unimaculatus*.—Fig. 1, profile; 2, top of the head:—natural size.

# ACCOUNT

OF THE

# ARCTIC CARBONIFEROUS FOSSILS.

BY

J. W. SALTER, ESQ., F.G.S.,

OF THE GEOLOGICAL SURVEY OF GREAT BRITAIN.

THE Expedition has been fortunate in supplying some missing links in the Geology of the Arctic regions. Former researches, dating from the time of Parry's voyages, had shown that the great formations of limestone which occupy the coast lines of the western Polar lands, were of Palæozoic age; and while the corals and other fossils from Boothia and Barrow Straits had been compared by Conybeare to those of our Dudley limestone, the fossil plants of Melville Island seemed to be identical in character with those of the coal measures.

The former of these suggestions, viz. that there was much *Silurian* limestone in Polar America, received abundant confirmation from the collections made by Captain Austin's Expedition.* And the inference, drawn from the plants in Melville Island, that the carboniferous rocks were not missing in the north, has been sustained unexpectedly by the researches of Captain Sir E. Belcher and the officers and gentlemen under his command.

* See Appendix, with plates, to Dr. Sutherland's Journal. Longman, 1852.

In the collections now brought home from the very furthest point visited, viz. the northern edge of Albert Land and the islands off that coast, lat. 77° to 77° 15′ N., we can recognize several characteristic carboniferous fossils, and indeed some of our own English species—large *Producti*, corals, etc.; and with these, as we might expect, are forms not yet described.

A short notice of similar fossils from Melville Island, lat. 76°, was offered lately to the Royal Dublin Society by the Rev. Professor Haughton. The collection was made at the same time with those now described, and presented to the society by Captain M'Clintock—a name well known as that of a zealous Arctic explorer. Among the fossils the Professor recognized one, if not two, identical with those of the carboniferous rocks of Britain.

But although these familiar fossils had never, before the late Expedition, been found in so high a latitude, we were in some degree prepared to meet with the marine equivalents of the carboniferous formation in one part or another of the great Arctic basin, both from the circumstance of fossil shells of that date having been found near the Slave Lake and along the Mackenzie, by Richardson,* and more especially from their occurrence in the northern part of the eastern hemisphere, even so far north as 74° 30′, off the North Cape. In the Transactions of the Royal Academy of Philosophy at Berlin, the Baron Von Buch described, in 1846, fossils of this age brought home by Keilhau from the rocky islet called Bear Island (Bären Insel) in that latitude.†

This islet, which lies to the south of Spitzbergen, is barely a mile in circumference, and is chiefly composed of limestone resting on coal shales, which, according to Von Buch, contain ferns of the genus *Pecopteris*.

The overlying limestone, which forms steep cliffs, was found to contain the large *Productus giganteus*, together with *P.*

* 'Narrative of a Journey,' etc. See also Murchison's 'Siluria,' p. 427.

† Von Buch, in Physikalische Abhandl. der Königl. Akad. der Wissenschaften (Berlin), vol. for 1846, p. 65, plate.

*punctatus* and *Strophalosia striata*, besides Corals and Bryozoa of the carboniferous type, and a species of *Spirifer* which Von Buch thought worthy of a separate account, and a comparison with other large exotic species.

The chief interest attaching to the last-mentioned fossil is, that the same peculiar *Spirifer* was found by Sir E. Belcher in company with the species about to be noticed.

It would be out of place here to notice the valuable contribution to Arctic geology made by Professor Koninck* of Liége, in which he shows distinctly the occurrence of the Permian rocks in Spitzbergen itself, in a latitude as high as that of Albert Land, were it not for the indication it affords of higher and higher geological horizons as we approach the pole; thus giving confirmation to another discovery of Captain Belcher and his associates, and which has just been elaborated by Professor Owen, viz. that secondary rocks—with bones of *Ichthyosauri!*—are to be detected in these Cimmerian regions. Some lias shells, too, are quoted by Professor Haughton (in the communication above adverted to), from Prince Patrick's Land, 76° 30′; so that there seems no good reason to doubt that true Lower Secondary strata, *in situ*, are to be found in this the extremest point of the western polar land; and that when these fossils were deposited, conditions of climate something like those of our own shores were prevailing in latitudes not far short of 80°.

It is not allowed to enter here into the speculations to which such discoveries must lead, and we return to the description of the fossils, premising that some of them—*Productus Cora*, *Spirifer Keilhavii*, etc.—were found on the top of Exmouth Island itself, the sandstone cliffs of which are capped by the limestone; and close upon this again lie the Ichthyosaurian bones. The greater part however of the fossils were weathered out on loose slabs which strewed the coast, particularly at Depôt Point, on the northern side of Albert Land, where

* First published in the Bull. de l'Académie Royale de Belgique (1846), vol. xiii. p. 592, and again repeated, with figures, in vol. xvi. No. 12.

they were very abundant, mixed with some pieces of Silurian limestone like those found by Penny and his comrades in the Wellington and Queen's Channels.*

Many new forms of these Silurian fossils remain undescribed, and some of great beauty were brought home by Captain Belcher himself. At present we can only notice the carboniferous species.

## FUSULINA HYPERBOREA (n. sp.).

Plate XXXVI., fig. 1–3.

The mountain limestone has been long known to contain Foraminifera of this type. One, the *F. cylindrica*, Fischer, is characteristic of the formation in Russia, and a smaller round species abounds in parts of the Caucasus.† The one found by Sir E. Belcher at Depôt Point is peculiar for its shape, being constricted in the middle instead of fusiform; the septa are highly undulated, and the several folds touch each other so closely as to look like reticulated tissue in a section. It may be shortly characterized thus:—

Five-eighths of an inch wide, subcylindrical, obtuse at the ends, constricted in the middle: whorls about seven or eight, of which four are conspicuous and of nearly equal width. Septa rather closely placed, excessively undulated (like a frill or furbelow), especially on their peripheral edge, with no plain median space; slit small, linear, on the inner margin of the septum.

We have both polished transverse and longitudinal (1 *b*) sections and weathered specimens (1 *a*) of this fine and remarkable species.‡ In the latter, where the whorls are worn down

* I strongly suspect there is a *Devonian* formation also here, but have not the means at present to work it out. *Atrypa reticularis*, with *Spirifer*, *Orthis*, and *Rhynchonella*, occurs in a blackish earthy limestone in Cardigan Strait, on the coast of North Yorkshire.

† Siluria, p. 335.

‡ The common *F. cylindrica*, which is not half the size of the *F. hyperborea*, is called by the Russian peasants "petrified corn," which it exactly resembles. Ours is more like an hour-glass with rounded ends.

J.D.C.Sowerby fecit.

Vincent Brooks Imp.

so as to show the inner portions of the septa, these are found to be scarcely more undulated than in the *F. cylindrica;* but there is no plain central space, the small median fissure being merely a linear perforation on the wavy surface. The outer portion of the septa, on the contrary, is excessively waved, so much so that the forward bends of two contiguous undulations often touch (fig. 3), and even coalesce and form a reticulate tissue. And in accordance with this, a longitudinal (*i. e.* spiral) section (1 *b*) shows the inner portion of the septa slightly curved and simple, while the outer and larger portion is deeply waved, and often (from a section of the extreme undulation) apparently branched. The septa, too, in the outer whorls are evidently more undulated than those of the inner ones, and towards the obtuse ends of the shell they are probably a good deal twisted, as the reticulate tissue there is complicated and confused in the sections.

Fig. 1, natural size; 1 *a*, slightly magnified—a weathered specimen, showing the slightly undulated inner septa; 2, a portion of these magnified; 1 *b*, a cross section (longitudinal), with four or five conspicuous whorls, and one or two obscure central ones; 3, a rough section, magnified, of two of the outer chambers, with their highly undulated septa.

Locality.—In loose blocks at Depôt Point, Albert Land; gregarious.

## STYLASTREA INCONFERTA (Lonsdale).

Plate XXXVI., fig. 4.

Syn. Lonsd. in Geol. Russ. vol. i. 621; pl. A, fig. 2.

At first sight this fossil, of which there are numerous examples in Sir E. Belcher's collection, looks so like the common *S.* (*Lithostrotion*) *basaltiforme* that it would be readily mistaken for one of its varieties. On comparing it, however, with specimens from Kendal, which have the same general internal structure, it is found to differ considerably "in the greater dimensions of the columns, in the more open structure of the interior, and in the centre being much less occupied by prolongations of the lamellæ." In these respects it agrees

well with Lonsdale's description of the species from the east side of the Ural; and his figure is very like, in the size of the tubes and their irregularly corrugated surface. The cross section, too, agrees very well in the comparatively few (38–40) lamellæ, of which only half are conspicuous, the intermediate ones being exceedingly short and obscure, in the wide space occupied by the central flattened tabulæ, and in the loose vesicular tissue. I do not think there is much doubt of their identity.

The British *Stylastrea* from Kendal has more numerous lamellæ (54 or 60), the intermediate ones being considerably developed and only a little shorter than the rest, and the vesicular tissue is closer and more abundant.

*Stylastrea*, being without any elevation of the tabulæ into a crest or columella, seems to be a natural division. Professor Milne Edwards is inclined to regard the absence of that organ as accidental: it is, however, characteristic of the two species above noticed.

Locality.—Depôt Point.

There are among these Arctic corals one or two species of *Lithostrotion* with a central axis—one particularly abundant; and there is also a large *Michelinea*, growing to a parabolic mass five or six inches high and four inches across, and with the calices half an inch in diameter.

## ZAPHRENTIS OVIBOS (n. sp.).

Plate XXXVI., fig. 5.

Nine to ten inches high and two in breadth, curved, sometimes strongly, and either gradually tapering or somewhat abruptly conical at the base, and thence cylindrical, and often a little contracted above. The surface is smooth, and regularly marked by ridges of growth about half a line apart, but seldom with constrictions: the calyx circular, deep, rather thin-edged, with numerous (36–44, or even 60 in a large specimen) prominent septa extending to within the margin of the smooth central tabula, which is elevated in the middle into a narrow crest continuous with the primary septum, but not

carried into the *fossula*. The latter is rather large, deep, placed on the (dorsal) curved side, and not at all invading the central tabula. One, or more frequently two, of the septa are abbreviated by it. The intermediate septa are extremely small and quite marginal.

The vesicular tissue is close and conspicuous between the septa, and in the cross section it forms a definite outer zone only three-eighths of an inch wide in a specimen two inches and a half in diameter. The horizontal tabulæ are wide, close set, not reaching quite across the central space, but imbricating. The lamellæ are nearly straight and equal, and leave only about one-third of the diameter free from them.

This is rather doubtfully referred to the genus. It has a thin crest-like columella connected with the primary septum opposite to the fossula, and should therefore be a *Lophophyllum* (Edw. et Haime). But this crest is so rudimentary in some specimens, and the habit is so much that of *Zaphrentis*, that we leave it for the present among them. It has well developed central tabulæ bare of lamellæ in the middle, and in this respect it is like the other large species, *Z. fungites*, *Z. cylindrica*, etc.

The septa are strong and continuous, and appear to extend all down the visceral chamber, and not merely to be spread out on the surface of the tabulæ. This is shown both in weathered casts and in transverse polished sections. Perhaps this indicates an approach towards the *Cyathaxonidæ*.

A rough resemblance to the horn of a ruminant has suggested the specific name.

Locality.—Very common among the loose fragments at Depôt Point. It is generally well preserved. A *Zaphrentis*, probably the same species, occurs further to the east, in Princess Royal Island, and at the entrance of Jones's Strait.

## CLISIOPHYLLUM TUMULUS (n. sp.).

Plate XXXVI., fig. 6.

A curved and twisted trumpet-shaped tube four inches long, annulated by rough ridges of growth and marked by faint

longitudinal ribs. The oblique cup two inches broad, thick-edged and deep, with the margin recurved, lined by about ninety close and nearly equal lamellæ (the intermediate ones being as strong as the others) descending to the bottom of a deep hollow a line broad, which surrounds the strong conical boss in the centre. The latter is almost cylindrical, more than half an inch broad and long, and much nearer to the concave than to the convex side of the tube. A few only of the principal ribs rise upon it irregularly, and one of them forms a considerably twisted ridge or crest. The boss is formed of close vesicular tissue (apparently twisted when weathered), a more open tissue occupying the spaces between the lamellæ.

At first sight one is inclined to separate this from *Clisiophyllum*, although in general form it is very like *C. coniseptum* or *C. turbinatum* of the mountain limestone. Milne Edwards has particularly mentioned the ribs on the conical axis of *Clisiophyllum* as straight, and in the English species they are stout lamellæ (inosculating a little), and one of them is generally elevated into a ridge or crest upon the boss. In the Arctic fossil this crest is present, but carried up upon the boss with a twist; and the state of weathering of the boss itself in our specimen is so complete as nearly to obliterate the straight lamellæ, and show the complicated (and apparently spiral) edges of its vesicular plates, so that it looks as if it were a large simple species of *Lonsdalia*, as that genus is defined by Milne Edwards (*Strombodes* of M'Coy). It is however a genuine *Clisiophyllum*, and differs from all we know by its very numerous equal lamellæ, the secondary ones reaching nearly all the way down the cup, and being as large as the principal ones; and further, by the great height and prominence of the boss, which is narrow compared with the breadth of the cup. The *C. coniseptum*, Keyserling, has a somewhat twisted arrangement of the lamellæ, but a much broader and less elevated boss.

Locality.—Depôt Point.

## SYRINGOPORA (AULOPORA) sp.

Plate XXXVI., fig. 7.

These reticulating creeping tubes overrun large specimens of the *Zaphrentis* before described. Such fossils used to be called *Aulopora*, but they are the young stoloniferous base of a *Syringopora*. This was first suggested to us by the late Professor E. Forbes, on examining the carboniferous fossils at Hook Point, in Wexford, where these corals abound. It has however been clearly shown to be the case by Professor Milne Edwards and J. Haime in their great work on Palæozoic Corals, (Archives du Muséum d'Hist. Nat. vol. v.)

It is impossible to say to what species of *Syringopora* such may belong, unless the full-grown coral were found with them. In size and shape they agree pretty well with the young portions of *S. geniculata*, so common in the English carboniferous limestone.

LOCALITY.—Depôt Point; frequent (on large corals).

## FENESTELLA ARCTICA, n. sp.

Plate XXXVI., fig. 8.

Portions of foliaceous plane fronds, which must have measured several inches across. The branches are thicker than broad, rounded on the non-poriferous face, slightly but regularly zigzag, and fully a third of a line broad; they are regularly radiating and bifurcating over the general surface; irregular, and some of them much thickened below. Fenestrules broad, oval, a line long, and fully twice the width of the branches. They are very regular in size and shape, those at the bifurcation of the branches being similar and equal to the rest. Non-poriferous surface very finely striated, appearing smooth to the eye; pores ——?

As we have nothing of the poriferous face, it may seem hazardous to give a name to this fossil; it is however a large and fine species, extremely regular in the disposition of the branches and size of the perforations, and will be easily recog-

nized, should any collectors visit in future its rugged habitat. *Fenestella Martis*, of Fischer (Oryct. Gouv. Moscou, pl. xxxix., fig. 2), is not unlike it, but the apertures are oval and but little broader than the interstices or branches, which are decidedly thicker than in ours. The same may be said of the *F. cribrioculata*, Verneuil, figured in Count Keyserling's 'Reise in Petschora-land,' pl. iii., fig. 7, which has neither so flat a surface nor such large perforations.

Locality.—Depôt Point.

### SPIRIFER KEILHAVII (Von Buch).

Plate XXXVI., fig. 9, 10, 11.

S. Keilhavii, Von Buch, Trans. Roy. Acad. Philos. Berlin, 1846, p. 65, fig. 2 in the plate.

Syn.—*S. Saranæ*, De Vern., in Keyserling Reise in Petschora, pl. viii., figs. 4, 5.

There can be no doubt of the identity of this shell with that so carefully described by Von Buch from the "Producten-Sandstein" of Bear Island. The square form, short hinge line,* elevated beaks, and broad deep plaits with ribs upon them, all agree exactly; and we think that the variety we have figured (fig. 11) will agree equally well with Count Keyserling's figures of the *S. Saranæ* from Petschora. It is so distinct a species from any European ones as not to need comparison, and Von Buch has compared it with its allies from New Holland and South Africa.

Our specimens are all of the larger ventral valve. In the ordinary variety (figs. 9 and 10) they are an inch and a half long, and as much broad, with the hinge-line, in full-grown shells, shorter than the entire width. Beak very convex, elevated and incurved, furrowed to the apex, from which radiate

* Von Buch says, "It belongs to the division in which the hinge line is as long as the shell." This must be intended to mark its relations with broader-winged Spirifers rather than with the smooth rounded forms, for one of its best characters resides in the very *short* hinge-line.

thick and broad folds, six to eight on each side (six or seven in our specimen). They are not quite simple, except near the hinge, but furnished with one or two ribs on the sides of the principal ones. The folds are rather angular, and much broader than the furrows between them, but the sinus is as broad as the largest ribs, and has about seven "fine, not broad ribs,"* one of which is central and more conspicuous.

The ventral valve, according to Von Buch, is only slightly convex.

The variety *Saranæ* (fig. 11) differs in having no central rib in the sinus, which is therefore angular and deep; but it shows the faint ridges both in the sinus and on the principal ribs. These are rather more numerous (fully seven) and distinct up to the hinge area, where the shell is sharply incurved. The ribs are rounder and not quite so angular as in the other variety.

Locality.—Depôt Point; also in red limestone, Exmouth Island (Belcher), with the next.

## PRODUCTUS CORA (D'Orbigny).

Plate XXXVI., fig. 12.

Our figure is an expanded and somewhat irregular specimen of the under (dorsal) valve, or rather the impression of its surface on the red limestone. The margin in this valve is abruptly turned down after the shell has attained a couple of inches in length, to fit the corresponding portion of the upper valve. This indicates that the latter must have been highly convex, and there are other smaller specimens of the upper valve from the same locality, more regular in form and with the beak prominent. The striation in both valves is characteristic, the wavy striæ being elevated threads, with furrows intervening wider than the ribs themselves. The striæ increase in number continually by implantation, appearing to bifurcate

* In his figure the supplementary ribs are a little stronger than in our specimens.

in the cast,* and in the flatter valve the new one frequently remains for a long distance much smaller than the others, and even vanishes and reappears after an interval. Both striæ and furrows are crossed by numerous fine decussating lines.

No traces of spines are visible in our few specimens, which agree in all respects (except perhaps in having a somewhat thicker shell) with British examples of the *P. cora*. It is very interesting to find this species, which is so universally spread over the warmer parts of the globe, from India to the Andes, and which has been described from Siberia and Bear Island, ranging into these extreme northern latitudes.

Locality.—Top of Exmouth Island, *in situ*, in a reddish limestone of a kind not found at Depôt Point. N.B. The bones of the Ichthyosauri were found in close proximity, on the highest point of the Island (Belcher).

## PRODUCTUS SEMIRETICULATUS (Martin), *var.* FRIGIDUS.

Plate XXXVI., fig. 13, 14.

Five inches wide and nearly three long; larger valve very gibbous at the beak, strongly and widely bilobed; ears produced and very distinct; concentric plaits less strong than the others; spines numerous; a distinct row parallel to the hinge margin, and another obliquely sloping from it. Under valve at first flat, then bent strongly down at right angles.

Notwithstanding the wide bilobation of this shell, we cannot think it anything but a conspicuous form of the variable *P. semireticulatus*. It has the same kind of coarse striation and concentric decussating plaits, very well shown in the left half of our figure 3, where the lower or dorsal valve is seen, the rest being broken away.

The form is certainly more transverse than usual, and the ears very distinct. In these particulars it resembles *P. ex-*

* This should always be borne in mind in describing fossil brachiopods, viz. that a rib interposed between two others will appear in the cast of the surface as a dividing furrow on a ridge.

1
d
p

2
n

4

3
np
n
np

5

10

6
np
np
n

7
h

11

8

9

*pansus* of De Koninck, a Russian species; but, besides that being a very much smaller shell, De Koninck particularly says, that near the cardinal edge the ribs are very fine or absent, and that there is *no trace* of cardinal tubes along them. His figure agrees with this description.

In plate ix. of his excellent monograph* he has given a figure of a very wide variety, strongly bilobed, but not so deeply as ours, and without the submarginal spines which other specimens show; and in thus enumerating the many varieties and extensive range of the species,† he gives us additional reason for admitting this one as a Polar variety.

All the specimens are striated coarsely, though our figure 14, which is very much worn, shows them but faintly. There are some large loose shining tubes (fig. 15) in the rock, which probably belong to this fossil.

Locality.—Depôt Point, in whitish and also in reddish limestone.

The two carboniferous species identified by Prof. Haughton from Melville Island are, *Productus aculeatus* and *Spirifer (rotundatus ?)*.

J. W. S.

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*Note on some Remains of an Ichthyosaurus discovered by Captain Sir Edward Belcher, C.B., R.N., at Exmouth Island, in lat. 77° 16′ N., long. 96° W.* *By* Professor Owen, F.R.S., F.G.S.

The specimens submitted to me by Captain Sir Edward Belcher, which form the subjects of Plate XXXI., are fossil remains of vertebræ and portions of ribs of an *Ichthyosaurus*.

Figs. 1, 2, and 3 represent the largest and best preserved fossil, which is the body of an anterior abdominal vertebra.

* Monogr. des *Productus*, etc., in Recherches sur les Anim. foss. première partie, 1847.

† Even up to the Icy Sea in Russia.

It presents the ichthyic character of the concavity of the articular surface on both the front and back part of the centrum *c*; with the character of coexisting diapophyses *d* and parapophyses *p*, not known in fishes, but which the *Enaliosauria* present in their anterior trunk-vertebræ, in common with the *Dinòsauria, Crocodilia,* and other highly organized reptiles. The generic characters of the *Ichthyosaurus* are manifested in the shortness (*i. e.* the relatively small fore and aft diameter) of the centrum as compared with its breadth and height, and in the shape of the neurapophysial surfaces *n p*, and their proportions to the neural surface *n*. With regard to the specific character of this vertebral centrum, its proportions pretty closely accord with those of the *Ichthyosaurus acutus* from the Whitby lias; but this would be quite inadequate ground for a reference of the Arctic Ichthyosaur to that species in the absence of any evidence of the shape of its skull and dentition.

Figures 4 to 7 are of a terminal caudal vertebra, of the natural size, apparently of the same species of Ichthyosaur and probably from the same individual as the vertebræ figs. 1–3, from the more advanced part of the body.

The small caudal vertebra equally manifests the Ichthyosaurian characters in its degree of biconcavity and in the form of the neurapophysial pits *n p*; the lateral compression of the centrum indicates the vertical development of the tegumentary tail-fin it helped to support: on the under surface are four surfaces for the hæmal arches, which are articulated, as in the Crocodiles, at the vertebral interspaces to two contiguous centrums.

Figs. 8 to 11 are portions of ribs. The long, free, thoracic-abdominal pleurapophyses, or vertebral ribs, of the *Ichthyosaurus* are peculiar for the deep longitudinal groove which impresses them on each side, giving to their transverse section the form represented in fig. 10. Two fragments of ribs, figs. 8 and 9, found associated with the before-described vertebræ, present this grooved character, and, with the vertebræ, afford cumulative proof of the Ichthyosaurian nature of the Arctic fossils represented in Plate XXXI.

E B del.

Vincent Brooks Lith King St Covent Garden.

Sir E. Belcher has kindly forwarded the following note on the locality of the above-described fossils:—

"The position on which these remains were found is situated in latitude 77° 16′ N. and longitude 96° W., 570 feet above the level of the sea. The base of the island is a friable, disintegrating sandstone, which has been worn away on all sides, leaving the concentric elevation, equal to one-third of its original diameter, rising abruptly from its base, so much so as to be accessible only on its western end.

"The summit is capped by a limestone formation of about one-fifth of the entire height, say 114 feet, resting on the sandstone, and having a dip at its western end (as may be noticed in Plate IV.) of seven degrees.

"It was at the right-hand pile marked on the Plate that, in the construction of the cairn, fossils were noticed; and at the last moment, on finishing the pile, two specimens were presented by one of the men, apparently fossil bones, but, from anxiety to proceed and save the season, were hastily thrust into the pocket, and consigned, with others, for future scrutiny. This happened at the end of the season in 1852. In 1853 no opportunity offered for revisiting the island; but, from specimens found on Table Island and on the main, the sole range of fossils was found to run in the assumed oval curve which would be formed by the dotted line connecting the Exmouth, Table, and Princess Royal Islands, continued by the mainland up to Cape Briggs.

"It is remarkable that no fossiliferous limestone is met with on the *westernmost pile* of Exmouth Island, nor on any of the lands outside of this oval space; and, excepting very rare specimens, no fossils of any kind reappear until reaching the entrance of Cardigan Strait, in 76° 38′ N., where it only occurs in boulders on the beach, and in the next position southerly, Cape Eden, in 75° 30′ N., where the 'Assistance' wintered in 1853–4. Between Cape Eden and Beechey Island fossils again become rare, and in the latter region do not appear to extend much beyond Cape Riley easterly. All the intervening localities seem to furnish the magnesian limestone or the old greywacke formations."

# ACCOUNT OF THE SHELLS

COLLECTED BY

## CAPTAIN SIR EDWARD BELCHER, C.B.,

NORTH OF BEECHEY ISLAND.

BY

LOVELL REEVE, F.L.S., F.G.S.

THE additions made by Sir Edward Belcher to the Molluscan Fauna of the Arctic Seas are greater than might have been expected from the researches already made in that direction, by Fabricius, Parry, Möller, and Loven. Out of forty-five species dredged in Wellington Channel and Northumberland Sound, comprised in the following list, scarcely half of them have been hitherto noted as inhabiting Greenland, and only one-third of them range so far south as our own shores. Twelve of the species have not been hitherto described, but three had been previously known as doubtful.

### LYMNÆA (Draparnaud).

*L. Vahlii*, Möller, Index Moll. Grœnlandiæ, p. 4.
Limnophysa Vahlii, Beck.

*L. Holbollii*, Möller, Ind. Moll. Grœn. p. 5.
Limnophysa Holbollii, Beck.

### BULLA (Lamarck).

*B. scalpta* (Pl. XXXII. Fig. 3 *a, b, c*). Bul. testâ ovatâ,

solidiusculâ, spirâ minutè immersâ, anfractibus sub lente transversim minutissimè et creberrimè impresso-striatis; pallide fulvâ.

The chief peculiarity of this species consists in the surface being very minutely and closely impressly-striated across.

*B. nucleola* (Pl. XXXII. Fig. 2 *a, b, c*). Bul. testâ oblongo-cylindraceâ, medio subcoarctatâ, lævigatâ vel striis incrementi arcuatim notatâ, apice angulato-immersâ, sulco latiusculo; intensè fulvo-castaneâ.

Of a compressly oblong-cylindrical form, with the spire so impressed as to show a broad internal groove, the shell being coated throughout with a dark fulvous-chestnut cuticle.

*B. semen* (Pl. XXXII. Fig. 4 *a, b, c*). Bul. testâ cylindraceo-ovatâ, tumidiusculâ, spirâ depresso-convexâ, suturâ impressâ, anfractibus lævibus, convexiusculis, ultimo anticè paululum descendente; fulvescente-albâ.

Of a short cylindrical form, somewhat swollen, with a depressly convex spire, having the suture faintly channelled.

*Hab.* Port Refuge, in ten fathoms, mud.

## NATICA (Lamarck).

*N. septentrionalis,* Beck, Möller, Index Moll. Grœn. p. 7.

*N. Grœnlandica,* Beck, Möller, Ind. Moll. Grœn. p. 7.

## MARGARITA (Leach).

*M. umbilicalis,* Broderip and Sowerby, Zool. Journ. vol. iv. Conch. Illus. Margarita, f. 5.

*Hab.* Northumberland Sound.

## LACUNA (Turton).

*L. vincta,* Montagu (Turbo), vol. ii. p. 307; Supp. pl. 12. f. 11.

The specimens comprise varieties *labiosa* and *quadrifasciata.*

*Hab.* Port Refuge.

## SCALARIA (Lamarck).

*S. Grœnlandica,* Chemnitz (Turbo), Conch. Cab. vol. xi. p. 155. pl. 195 A. f. 1878, 1879.

S. planicostata, Kiener.

S. subulata, Couthouy.

*Hab.* Lievely, Greenland.

## BUCCINUM (Linnæus).

*B. Belcheri* (Pl. XXXII. Fig. 7 *a, b*). Bucc. testâ oblongo-ovatâ, basi truncatâ, tenui, anfractibus convexis, spiraliter lineari-sulcatis, aperturâ ovatâ, columellâ arcuatâ, anticè sub-excavatâ, contortâ; intus extusque livido-castaneâ, pellucidâ, epidermide tenui deciduâ indutâ.

Belonging to the same arctic type as *B. ciliatum, tenebrosum,* and *hydrophanum,* but clearly distinct from either.

*Hab.* Port Refuge, in eleven fathoms, mud.

*B. scalariforme,* Beck, Möller, Ind. Moll. Grœn. p. 11.

B. tortuosum, Reeve.

*B. glaciale,* Linn. Syst. Nat. (12th edit.) p. 1204.

*B. Donovani,* Gray, Zool. Beechey's Voy. p. 128.

B. glaciale, Donovan.

*B. hydrophanum,* Hancock, Ann. and Mag. Nat. Hist. vol. xviii. p. 325.

## FUSUS (Bruguière).

*F. tortuosus* (Pl. XXXII. Fig. 5 *a, b*). Fus. testâ angustè fusiformi, canali peculiariter contractâ et contortâ, spiræ suturis impressis, anfractibus rotundatis, spiraliter liratis, liris funiculatis, concentricis, versus aperturam minus elevatis, aperturâ parvâ, ovatâ, columellâ arcuatâ, basi tortuosâ; opaco-albâ, epidermide crassiusculâ olivaceâ indutâ.

Very closely allied to *F. Islandicus* and *propinquus,* but distinct from all the varieties of those species by its rounded closely-edged whorls and twisted canal, in which latter character it agrees rather with the little *F. pygmæus* of Gould.

1a.
1b.
1c.
2a.
2b.
2c.
3a.
3b.
3c.
4a.
4b.
4c.
5a.
5b.
6a.
6b.
7a.
7b.

*F. Spitzbergensis* (Pl. XXXII. Fig. 6 *a*, *b*). Fus. testâ fusiformi-turritâ, canali breviusculo, vix recurvo, spiræ suturis impressis, anfractibus rotundatis, spiraliter costatis, subfuniculatis, versus aperturam sulco superficiario obsoletè divisis, interstitiis excavatis, aperturâ ovatâ, labro peculiariter effuso; fulvo-fuscâ, costis subnitentibus, columellâ roseo pallidè tinctâ.

This fine species (inserted here from Mr. Cuming's collection) is from Spitzbergen.

TROPHON (Montford).

*T. Fabricii*, Beck, Möller, Ind. Moll. Grœnlandiæ, p. 14.
Tritonium craticulatum, Fabricius.
Murex borealis, Reeve.

MITRA (Lamarck).

*M. Grœnlandica*, Beck, Möller, Ind. Moll. Grœnlandiæ, p. 15.

CEMORIA (Leach).

*C. cognata*, Gould.

PATELLA (Linnæus).

*P. cerea* (Pl. XXXII. Fig. 1 *a*, *b*, *c*), Möller, Ind. Moll. Grœnlandiæ, p. 16.

A diaphanous white species, decussated with fine radiating linear ridges and concentric striæ of growth. Mr. Cuming possesses specimens from Norway.

*Hab.* Winter Quarters off Cape Eden, in three fathoms, gravel.

ACMÆA (Eschscholtz).

*A. testudinalis* (Patella), Müller, Zool. Dan. Prodr. p. 237.
P. Clealandii, Sowerby.
P. amœna, Say.
Lottia testudinalis, Gray.
Patelloidea amœna, Couthouy.

## CHITON (Linnæus).

*C. ruber*, Linnæus, Syst. Nat. (12th edit.) p. 1107.
C. cinereus, O. Fabricius.
C. minimus, Spengler.
C. lævis, Loven.

*C. albus*, Linnæus, Syst. Nat. (12th edit.) p. 1107.
C. aselloides, Lowe.
C. sagrinatus, Couthouy.

## PECTEN (Bruguière).

*P. Islandicus*, Müller (Ostrea) Zool. Dan. Prod. No. 2990.
*Hab.* Lievely, Greenland.

## LIMA (Bruguière).

*L. subauriculata*, Montagu (Pecten), Test. Brit. Supp. p. 63. pl. 29. f. 2.
L. nivea, Philippi.
L. sulcata, Brown.
L. sulculus, Leach.

## NUCULA (Lamarck).

*N. Portlandica*, Hitchcock (Pl. XXXIII. Fig. 3 *a*, *b*). Nuc. testâ oblongo-ovatâ, gibbosiusculâ, latere postico rotundato, antico subangulato contracto, rostrato, paululum hiante; albidâ, epidermide virescente corneâ indutâ.

Distinguished chiefly by a peculiar flexuous contraction of the anterior side, which is beaked and slightly gaping at the extremity.

*N. siliqua* (Pl. XXXIII. Fig. 4 *a*, *b*). Nuc. testâ oblongo-ovatâ, latiusculâ, tenuiculâ, tumidâ, latere postico rotundato, antico angulato-flexuoso, deinde concavo, et abbreviato-rostrato; albidâ, epidermide corneâ virescente-olivaceâ indutâ.

Of the same typical form as *N. Portlandica*, swollen and flexuously beaked, but of broader and more gibbous proportions.

1a.


1b

1c

2a.

4a.

3a.

2b

4b

3b

5a.

7a.

6a.

5b

6b

7b

Specimens of this species were dredged from a depth of seventy-four fathoms.

*N. sulcifera* (Pl. XXXIII. Fig. 1 *a*, *b*, *c*). Nuc. testâ subangustè-ovatâ, compressâ, ad umbones gibbosiusculâ, subæquilaterali, latere postico rotundato, antico leviter concavo-flexuoso et obtusè rostrato, valvis concentricè superficialiter sulcatis, sulcis distantibus; albidâ, epidermide virente corneâ indutâ.

A narrow, ovate, flexuously-beaked species, marked with concentric, superficial, widely-separated grooves.

*N. expansa* (Pl. XXXIII. Fig. 2 *a*, *b*). Nuc. testâ subtrigono-ovatâ, vix ventricosâ, subcompressâ, latere antico brevissimo, truncato, vix nullo, postico rotundato, expansoproducto; albâ, epidermide corneâ cinereo-virente nitente indutâ.

Allied to *N. inflata*, Hancock, but more compressed and more expandedly produced posteriorly.

*Hab.* Northumberland Sound and Port Refuge.

*N. sapotilla*, Gould, Invert. Mass. p. 100. f. 61.

## LEDA (Schumacher).

*L. buccata*, Steenstrup, Möller, Ind. Moll. Grœnlandiæ, p. 17.

## MODIOLA (Lamarck).

*M. marmorata*, Forbes (Modiola), Malacologia Monensis, p. 44.

M. tumida, Hanley.

M. Poliana, Philippi.

*M. lævigata*, Gray, Appendix, Parry's Voy. to North Pole, p. 245.

*M. nigra*, Gray, Appendix, Parry's Voy. to North Pole, p. 245.

M. depressa, Hanley.

## ASTARTE (Sowerby).

*A. Richardsoni* (Pl. XXXIII. Fig. 7 *a*, *b*). Ast. testâ sub-

trigono-orbiculari, convexo-compressâ, præcipuè ad umbones, umbonibus submucronatis, lateribus concavo-declivibus, areis subangustè excavatis, valvis circa umbones confertim sulcatis, deinde lævibus; calcareo-albâ, epidermide intensè nigro-castaneâ indutâ.

This fine species, of which specimens were first collected by Sir John Richardson at the mouth of the Mackenzie River, may be at once distinguished from those next allied to it, *A. lactea* and *Islandica*, by its more compressed growth and the attenuated prominence of the umboes, from which the narrowly excavated areas on each side slant almost concavely.

*A. fabula* (Pl. XXXIII. Fig. 5 *a*, *b*). Ast. testâ transversè ovatâ, compressâ, versus umbones subtrigonâ, lateribus utrinque subconcavis, deinde rotundatis, circa umbones regulariter sulcatâ, deinde lævigatâ aut striis incrementi notatâ, areis lateralibus parum excavatis; fulvescente-castaneâ.

Of a compressed triangularly-ovate form, more than usually transverse.

*A. globosa* (Pl. XXXIII. Fig. 6 *a*, *b*). Ast. testâ subtrigonâ, ventricosâ, transversim minutè sulcatâ, luteo-fuscâ, parte anteriore prominente rotundatâ, parte posteriore obtusâ, truncatâ.—Möller, Moll. Index Grœnlandiæ, p. 20.

Distinguished particularly from all other species of the genus by its globose, heart-shaped, Cyclas-like growth.

## CARDIUM (Linnæus).

*C. Grœnlandicum*, Chemnitz, Conch. Cab. vol. vi. pl. 19. f. 198.

C. edentulum, Sowerby.

Aphrodite columba, Lea.

*C. ciliatum*, Fabricius.

*C. Fabricii*, Deshayes.

## TELLINA (Linnæus).

*T. proxima*, Brown, Zool. Beechey's Voy. p. 154. pl. 44. f. 4.

T. sordida, Couthouy.
T. calcarea, Lyell.
Sanguinolaria sordida, Gould.

PANDORINA (Scacchi).

*P. arenosa*, Möller, Ind. Moll. Grœnlandiæ, p. 20.
*Hab.* Port Refuge.

SAXICAVA (Fleurian).

*S. rugosa*, Linnæus (Mytilus), Syst. Nat. (12th edit.) p. 1156.
Saxicava distorta, Gould.

MYA (Linnæus).

*M. truncata*, Linnæus, Syst. Nat. (12th edit.) p. 1112.

HYPOTHYRIS (Phillips).

*H. psittacea*, Chemnitz (Anomia), Conch. Cab. vol. viii. p. 106. pl. 78. f. 713.
Terebratula psittacea, Lamarck.
*Hab.* Principally Northumberland Sound, attached to rocks at a depth of thirty-three fathoms.

# ACCOUNT OF THE CRUSTACEA.

BY

THOMAS BELL, ESQ., V.P.R.S.,

PRESIDENT OF THE LINNEAN SOCIETY.

THE collection of Crustacea brought by Captain Sir Edward Belcher is not very numerous, but there are a few new species, besides some interesting ones which have been described by former naturalists. The specimens were all obtained by the dredge between Beechey Island and Northumberland Sound, and generally in depths exceeding thirty fathoms.

I have found it necessary in some instances to revise the specific characters given by former writers.

## *DECAPODA MACRURA.*

### HIPPOLYTE BOREALIS (Owen).

Thorace cylindraceo, anticè subcarinato, angulo antico-inferiore mutico, caudæ laminâ mediâ spinis minutis 16 ad 20 armatis.

*Hippolyte borealis*, Owen, in Append. to Captain Sir John Ross's Voyage, p. lxxxiv. t. B. f. 3; Edw. Hist. Nat. des Crust. ii. p. 373.

It was very truly observed by Colonel Sabine, in his account of the Crustacea obtained in Parry's voyage, that the number of teeth on the rostrum in the different species of *Hippolyte* is no good criterion of specific distinction, and this is particularly true of the present species. The rostrum is straight, in some individuals with, in some without, an inferior carina;

in some there are no teeth at all, either on the carapace or the rostrum; in others, a few small inconspicuous serrations, and in others a few small teeth. It is readily distinguished from *H. polaris*, and from all other species, by the characters given above.

## HIPPOLYTE ACULEATA (Fabr.).

Thorace gibboso, fortiter quinque-dentato, rostro tenui, pedunculo antennæ superioris vix longiore.

*Cancer aculeatus*, Oth. Fabr., Fauna Grœnl., No. 217.

*Alphæus aculeatus*, Sab., App. to Parry's Voyage, p. ccxxxvii. t. ii. f. 9, 10.

*Hippolyte aculeata*, Edw., Hist. Nat. ii. p. 380.

A single small specimen only was found in the collection, without any distinct locality being named. Colonel Sabine states that several specimens were found at Melville Island. It is at once recognized by the slender short rostrum and the extraordinary gibbosity of the carapace.

## HIPPOLYTE POLARIS (Sabine).

Thorace gibboso, anticè carinato, rostro lamellâ antennæ superioris breviore, chelis et unguibus apice nigris.

*Alphæus polaris*, Sabine, App. to Parry's Voyage, p. ccxxxviii. t. ii. f. 5–8.

*Hippolyte polaris*, Edw., Hist. Nat. des Crust. ii. p. 376; Owen, in Ross's Voy., p. lxxxv.

In this species the female is so much larger than the male, and the thorax so much more strongly gibbous, that the two sexes might at first sight be readily mistaken for different species. The figure given by Colonel Sabine is that of a male.

The number of teeth on the rostrum varies greatly; I found from two to four on the upper, and from two to five on the under side. Colonel Sabine states from three to six above and from two to six below. Milne Edwards has erroneously given eight to ten on the upper, and two or three on the under side. The carapace has invariably three teeth on the carina.

It would appear to be an abundant species, as there were

numerous specimens in the collection, and Colonel Sabine states that "several were brought up in the same drag-net, from fifty fathoms on the coast of Melville Island."

## HIPPOLYTE BELCHERI (n. s.).

PLATE XXXIV., fig. 1.

Thorace subcylindraceo, haud gibboso, rostro recto, abdominis segmento tertio spinâ uncinatâ forti armato.

In this new species, the body is slender and smooth; the carapace nearly cylindrical, with a single tooth at the outside of the orbilar notch, slightly carinated on the anterior half, but not gibbous, the carina with two small teeth; the rostrum straight, narrow, with three very small teeth above and two beneath, in the single specimen observed; the outer filament of the superior antenna thickened near the base, and gradually tapering to the extremity. The abdomen is strongly bent at the third segment, which is armed, near the posterior margin, with a strong hooked spine, curved backwards; the fifth and sixth segments with a small triangular spine at the anterior angle; the seventh (middle lamina of the tail), with five pairs of minute spines above. Antennæ, legs, and pedipalps very slender; first pair of abdominal false feet as large as the others.

Length from rostrum to tail, 1·8 inch.

This species has the strong hooked spine which is characteristic of *H. Sowerbæi*, but it differs widely from it in its general character. It belongs, in fact, with that exception, to the more smooth and slender section of the genus.

A single specimen only was found in the collection, without any particular locality being designated.

## CRANGON BOREAS (Auct.).

*Cancer boreas*, Phipps' Voy., App. 190. t. 12. f. 1.

*Crangon boreas*, Sab., Parry's Voy. ccxxxv.; Edw., Hist. Nat. des Crust. ii. p. 342.

Two specimens were obtained, one of which was a remarkably large one.

Vincent Brooks Lith.

## Fam. *CUMADÆ.*

### ALAUNA GOODSIRI.*

Plate XXXIV., fig. 2.

Rostro recto, segmentis abdominis angulatis.

"In the thirteenth volume of the 'Annales des Sciences Naturelles,' Dr. Milne Edwards described a small crustacean under the name of *Cuma Audouinii;* but in his 'Histoire Naturelle des Crustacés,' he expresses his doubt whether this little animal be anything more than the larva of a decapodous form, and places it amongst other doubtful examples, in an Appendix.

"In 1843, however, Mr. Harry Goodsir published, in the 'Edinburgh New Philosophical Journal,' a very full and clear description of this and two other species of *Cuma* and of two allied species, which he considered as the types of two new genera, to which he gives the names respectively of *Alauna* and *Bodotria.* The whole of these I have ventured to consider, *provisionally,* as constituting a small family, probably belonging to the lower Decapoda, which appears also to be Mr. Goodsir's own opinion, though expressed with doubt, in which doubt I entirely agree. This author satisfactorily determined that they are perfectly developed animals, and not mere larvæ."†

Such is a succinct account of what was known respecting the little animals which I ventured to consider as constituting the family Cumadæ, but the details of their structure given by Mr. Goodsir afforded very imperfect grounds for judging of their real position in the Class.

* It is with a melancholy sense of duty that I dedicate this species to the lamented naturalist, whose untimely fate is connected with the saddest associations; and this feeling is enhanced by the recollection of that remarkable zeal and talent by which he was distinguished, and from which, had he been spared, results the most important to the extension of natural science might have been anticipated.

† Bell's Brit. Crust., p. 321.

The occurrence of a very large specimen of a new species of *Alauna* in Sir Edward Belcher's collection has afforded to Mr. Westwood an opportunity of figuring, for the present Paper, the details of the anatomy of all the essential parts,—a task which, as a reference to the figures will show, he has executed with his usual unrivalled accuracy and tact. These details appear to confirm the opinion that this family must be placed amongst the lower forms of the decapodous group. The number and general structure of the parts connected with the office of manducation, and of the thoracic feet, are entirely consistent with this view; and the structure of the tail, which is formed of the appendages to the sixth abdominal segment and of the seventh, no less agrees with it. The absence of any ocular peduncle however shows an aberration from the type, of such importance as to throw a strong apparent doubt upon the subject. Besides the single large specimen, there are several others in the collection considerably smaller (fig. 3), which differ in some characters, as the less convex form of the carapace, more obvious rugæ on the fore part of it, and the existence of an acute point on each side of the last leg-bearing segment. These may be immature individuals, or possibly males, or they may perhaps be specifically different.

*Hab.* Wellington Channel, in thirty-five to seventy fathoms.

## *STOMOPODA.*

A single specimen of a *Mysis*, probably *M. Fabricii*, was in too decomposed a condition to be identified with certainty.

## *AMPHIPODA.*

### GAMMARUS SABINI (Leach).

*Gammarus Sabini*, Leach, in Ross's Voyage, ii. p. 178; Sabine, Parry's Voyage, Append., p. ccxxxiii.; Kroyer, Amphip., p. 16. t. i. f. 3; Edw., l. c. iii. p. 50.

## GAMMARUS LORICATUS (Sabine).

*Gammarus loricatus*, Sabine, Parry's Voyage, Append., p. ccxxxi. t. i. f. 7. Kroyer, l. c., p. 22. t. i. f. 4; Edw., l. c., p. 52.

## GAMMARUS BOREUS (Sabine).

*Gammarus boreus*, Sabine, l. c., p. ccxxix.
? *Squilla pulex*, Degeer, Ins. vii. p. 525. t. xxxiii. f. 1, 2.

For an excellent description of this species, and a critical examination of its identity with *Squilla Pulex* of Degeer, I must refer to the original account of it by Colonel Sabine, above quoted.

## GAMMARUS KROYERI (n.s.).

PLATE XXXIV., fig. 4.

Antennis superioribus inferioribus dimidio longioribus, abdominis segmentis quatuor anterioribus in medio, secundo et tertio ad angulum inferiorem posticum, in dente productis.

Superior antennæ half as long again as the inferior; the accessory filament extremely minute; the anterior (four) thoracic epimeral plates increasing gradually in size, rounded beneath, the fourth slightly produced at the posterior margin; the fifth and sixth with a lobe at the anterior-inferior portion; the seventh oval. First and second pairs of thoracic feet cheliform; the second with the penultimate joint very broad, obliquely truncate; third and fourth simple; the three following with the third joint very large and oval. Abdominal false feet normal. There is a small triangular dentiform process, directed backwards, on the middle of the posterior margin of the anterior four segments of the abdomen, and the postero-inferior angle of the second and third is similarly produced.

This species has a very close resemblance to *Amphitoe bicuspis* of Kroyer. It is however a true *Gammarus*, as the accessory filament of the superior antennæ does exist, although extremely small.

*Hab.* Wellington Channel, in thirty-five fathoms.

## LYCIANASSA LAGENA (Kroy.).

*Lycianassa lagena*, Kroy., Grœnl. Amfip., p. 9. t. i. f. 1; Edw. Crust. iii. p. 21.

*Anonyx lagena*, Kroy., l. c., p. 16.

Of this species numerous fine specimens are in the collection.

## AMPHITÖE LÆVIUSCULA (Kroy.).

*Amphitöe læviuscula*, Kroy., Grœnl. Amfip., p. 53. t. iii. f. 13; Edw. Crust., p. 30.

## AMPHITÖE JURINII? (Kroy.).

A specimen in a broken state occurs, which may probably be of this species.

## ACANTHOSOMA HYSTRIX (Owen).

*Acanthosoma hystrix*, Owen, Append. to Ross's Second Voyage, p. xci., pl. 8. f. 4–7.

*Amphitöe hystrix*, Kroy., Grœnland's Amfip., p. 31. t. ii. f. 7; Edw. Hist. Nat. Crust. iii. p. 40.

## STEGOCEPHALUS (Kroy.) AMPULLA (Phipps).

PLATE XXXV., fig. 1.

*Cancer Ampulla*, Phipps' Voy. Append. p. 192. t. xii. f. 3; Herbst, ii. p. 117. t. xxxv. f. 2.

*Gammarus Ampulla*, Sab., Suppl. Parry's First Voyage, p. ccxxix.; Ross, Append. to Parry's Polar Voyage, p. 204.

*Amphitöe Ampulla*, Edw., l. c., iii. p. 22.

*Stegocephalus Ampulla*, Kroy., Naturh. Tijdsk., iv. 150.

An opportunity offered, by the occurrence in the collection of several fine specimens of this species, of giving a correct figure of the animal, together with the details of the essential parts of its organization. The figures hitherto published, and referred to above, are exceedingly imperfect and incorrect;

Vincent Brooks Lith.

Herbst's is merely a bad copy of that of Phipps. Mr. Westwood's, now given, is remarkably characteristic, and the anatomical details are extremely correct and interesting. A reference to the Plate will render any particular description of these parts unnecessary.

There were numerous young contained in the ovigerous pouch of the female figured in the Plate. They had undergone their metamorphosis, and were in every respect like the parent, with the exception of the antennæ, which were thicker, and less numerously jointed.

*Hab.* Northumberland Sound, in seven fathoms.

## *LÆMODIPODA.*

### CAPRELLA SPINIFERA (n. s.).

PLATE XXXV., fig. 2.

Segmentis omnibus corporis spinis armatis.

The head in this very distinct species is very short, the eyes round and black; the superior antennæ almost as long as the body, of which length the peduncle constitutes nearly half; the first joint cylindrical, half as long as the second, which is slightly enlarged forwards; inferior antennæ about half the length of the superior; the first joint of the peduncle very short, the second only a little longer, the third three times as long as the first and second. Footjaws four-jointed, slightly curved; first segment of thorax somewhat pyriform, with several minute tubercles, and two little spines close to its junction with the head; the second, third, and fourth segments thickened at the middle, at which part is a partial circle of spines, as well as several others at the anterior and posterior part; fifth segment largest at the posterior part, and spined as the others; sixth and seventh segments very short, narrowed anteriorly; the seventh furnished with a pair of simple curved appendages. Abdominal segment extremely small, with two pairs of appendages, of which the smaller pair are simple, and the larger two jointed. Anterior pair of legs slender and weak, scarcely twice

as long as the first thoracic segment; the second pair long and robust; the hand thick, with a strong spine near the base beneath, which is met by the finger when bent. The three posterior pairs slender, the penultimate joint with a small spine or tubercle, meeting the nail when closed, as in the hand of the second pair.

Length of body, 1·4 inch.

*Hab.* Throughout the Strait: motion barely perceptible.

## *ISOPODA.*

### ARCTURUS BAFFINI (Sabine).

*Idotæa Baffini*, Sab., Append. to Parry's Voy. p. 50. t. i. f. 4–6.
*Arcturus tuberculatus*, Latr., Reg. An. Cuv., ed. 2, iv. p. 139.
*Arcturus Baffini*, Westwood, Trans. Ent. Soc. i. p. 72; Edw. Hist. Nat. Crust. iii. p. 123. t. 31. f. 1.

### IDOTÆA ENTOMON (Lin.).

*Oniscus Entomon*, Lin., Faun. Suec. et Syst. Nat.
*Cymothoa Entomon*, Fabr., Ent. Syst. ii. p. 605.
*Idotæa Entomon*, Bosc. Latr.; Edw. Crust. iii. p. 128.

Numerous fine specimens of these two species of Isopods are in the collection.

## *PYCNOGONIDÆ.*

### NYMPHON HIRTIPES.

PLATE XXXV., fig. 3.

Pedipalparum digito mobili curvo, digito immobili multò superante; pedibus omnibus hirtis.

The rostrum is cylindrical, rounded at the apex; head with the anterior margin notched; the footjaws rather slender, the second joint having the immovable finger straight, the movable one much longer and moderately curved; the palps of the footjaws, or first pair of articulate appendages, five-jointed,

having the thoracic segments nearly equal, the legs with all the joints hairy, the nails abruptly bent.

As there is no figure of *Nymphon hirtum* of Fabricius, it is not possible to ascertain whether the present animal is identical with that or not, but it appears to me that it is distinct, as there is no hairiness about the body of *hirtipes*.

*Hab.* Northumberland Sound, in thirty-three fathoms.

## NYMPHON ROBUSTUM.

PLATE XXXV., fig. 4.

Pedipalparum chelis globosis, digitis valde curvis; pedibus compressis lævibus.

This very large species is remarkable for the peculiar structure of the pedipalps, which are robust and thick, the terminal portion or hand almost globular, with the fingers much curved, meeting at the points, and thus forming nearly a circle; the legs are strong and large, somewhat compressed, and quite naked.

In these descriptions I have considered the segment next to the cylindrical rostrum as the head, of which it is clearly the homologue, as the footjaws and the articulated appendages are attached to the anterior part of this segment.

*Hab.* Northumberland Sound, in thirty-three fathoms.

## EXPLANATION OF THE PLATES

### PLATE XXXIV.

Fig. 1. *Hippolyte Belcheri.*—1 *a*, natural size; 1 *b*, superior antennæ, the tip of the inner filament removed; 1 *c*, terminal segment, with the caudal plates on one side.

Fig. 2. *Alauna Goodsiri.*—2, natural size, viewed above. 2 *a*, natural size. 2 *b*, upper antenna. 2 *c*, one of a pair of delicate knife-like plates, having a thickened line running obliquely from base to apex; the thin outer edge rounded at the tip, folding over on the inner edge; these rest within the concavities of the two portions of the rostrum, and are supposed

by Mr. Westwood, with much probability, to be the representatives of the scales of the antennæ. 2 *d*, two lower antennæ, with the second antennal segment. 2 *e*, mandibles. 2 *f*, upper maxilla. 2 *g*, lower maxilla. 2 *h*, labium. 2 *i*, inner foot-jaw. 2 *l*, one of the first pair of compound feet. 2 *m*, one of the last pair of compound feet. 2 *n*, one of the middle pair of compound feet. 2 *o*, one of the first pair of simple feet. 2 *p*, front of the body seen from above. 2 *q*, under side of the middle portion of the foot-bearing segments; those bearing the compound feet furnished with a pair of flattened compressed leathery plates, the faces of which are opposed to each other.

Fig. 3. The carapace, pedigerous segments, and basal segment of the abdominal portion of the smaller individuals found, of which there were no fewer than twenty-seven. The carapace is less convex, more transversal, rugose at the anterior part; the last leg-bearing segment produced into an acute point on each side.

Fig. 4. *Gammarus Kroyeri.*—4 *a*, natural size. 4 *b*, the two central divisions of the terminal segment.

## Plate XXXV.

Fig. 1. *Stegocephalus Ampulla.*—1 *a*, front of head; both antennæ on one side removed. 1 *b*, labium of two mandibles. 1 *c*, under side of left mandible, showing the articulation of the flattened articulated appendage. 1 *d*, first maxilla. 1 *e*, second maxilla. 1 *f*, half of the labrum. 1 *g*, a minute ciliated membranous appendage, which may possibly be a portion of a maxilla. 1 *h*, footjaws. 1 *i*, one of the first pair of feet. 1 *k*, tail-pieces. 1 *l*, one of about fifty young taken from the ovigerous pouch.

Fig. 2. *Caprella spinifera.*—2 *a*, natural size. 2 $b_x$ upper lip. 2 *c*, "palpigerous mandibles?" 2 *d*, first maxilla. 2 *e*, second maxilla. 2 *f*, labium. 2 *g*, footjaws. 2 *h*, terminal segments of the body seen from above. 2 *i*, the same seen sideways, showing a pair of short exarticulate filaments attached to the last leg-bearing segment, and a pair of similar

appendages, accompanied by a pair of larger two-jointed ones, attached to the minute terminal representative of the abdomen.

Fig. 3. *Nymphon hirtipes*.—3 *a*, oculigerous footstalk seen from above. 3 *b*, chelæ (footjaws). 3 *c*, one of the first pair of articulated appendages (palps of footjaws).

Fig. 4. *Nymphon robustum*.—4 *a*, a chela or footjaw. 4 *b*, palp of footjaw, or first articulated appendage. 4 *c*, one of the ovigerous appendages. 4 *d*, one of the same in one of the young ones attached to 4 *c*.

For the elaborate anatomical details of the Plates, and for the greater part of the description of them which I have adopted, I have to acknowledge my obligation to Mr. Westwood.

# INSCRIPTIONS

ON

# THE CENOTAPH IN BEECHEY ISLAND.

(VOL. II., P. 231.)

Sacred

TO THE MEMORY OF

MONSIEUR BELLOT,

LIEUTENANT IN THE FRENCH NAVY,

AND

CHEVALIER OF THE LEGION OF HONOUR,

WHO ACCOMPANIED MR. KENNEDY

AND CAPTAIN INGLEFIELD

ON THEIR RESPECTIVE VISITS TO THE

ARCTIC REGIONS.

Whilst attached to H.M.S. Phœnix, under Captain Inglefield, he gallantly volunteered to convey Despatches to Captain Sir E. Belcher, with a sledge crew from H.M.S. North Star.

In a heavy gale of wind on the 18th August, 1853, he was drowned by the disruption of the ice near Cape Grinnell, much lamented by the Arctic Squadron and all who had the pleasure of knowing his value and noble spirit.

Sacred

TO THE MEMORY OF

WILLIAM CUTBUSH,

PRIVATE ROYAL MARINE,

H.M.S. ASSISTANCE,

A NATIVE OF NORTHIAM, SUSSEX,

WHO DIED ON BOARD

ON THE 27TH FEBRUARY, 1853,

AFTER A PROTRACTED ILLNESS FROM

DISEASE OF THE LUNGS,

AGED 34 YEARS.

He served with credit in his corps for upwards of 16 years and 4 months, gaining by his good conduct two badges of merit in addition to the Syrian medal. During twelve months of the above period he served in H.M.S. Assistance, gaining the respect of Captain and officers, and beloved by all who knew him, and died deeply lamented by his shipmates.

Happy are they who die in the Lord.

He lies interred in Northumberland Sound.

Sacred

TO THE MEMORY OF

ISAAC BURNETT,

CAPTAIN OF THE MAINTOP,

AND

GEORGE HARRISS, A.B.,

SEAMAN,

OF H.M.S. ASSISTANCE,

THE LATTER ATTACHED TO H.M.S.

TENDER PIONEER.

ISAAC BURNETT

DEPARTED THIS LIFE

ON 28TH JANUARY, 1854,

AGED 28 YEARS.

GEORGE HARRISS

DEPARTED THIS LIFE

ON THE 9TH JANUARY, 1854,

AGED 30¼ YEARS.

Both fell victims to scurvy, although the former laboured primarily under scorbutic affection of the ankle.

Their remains lie interred on shore in Disaster Bay, where H.M.S. Assistance and tender wintered, 1853–4.

Blessed are those who die in the Lord.

Sacred

TO THE MEMORY OF

JOHN AMES, A.B.,

WHO DIED ON BOARD

H.M.S. INVESTIGATOR, AT

BARING ISLAND,

APRIL 11TH, 1853,

AGED 29 YEARS.

Sacred

TO THE MEMORY OF

THOMAS MABLEY,

PRIVATE ROYAL MARINE,

WHO DIED SUDDENLY ON BOARD

H.M.S. RESOLUTE, AT DEALY ISLAND,

OCTOBER 19TH, 1852,

AGED 40 YEARS;

ALSO

TO THE MEMORY OF

GEORGE DROVER,

CAPTAIN OF THE FORECASTLE,

WHO DIED ON BOARD

H.M.S. TENDER INTREPID,

AT DEALY ISLAND,

DECEMBER 12TH, 1852,

AGED 28 YEARS.

Sacred

TO THE MEMORY OF

JOHN COOMBS,

STOKER,

H.M.S. TENDER INTREPID,

WHO DIED SUDDENLY

WHILE TRAVELLING NEAR POINT NIAS,

MELVILLE ISLAND,

MAY 12TH, 1853,

AGED 34 YEARS;

ALSO

TO THE MEMORY OF

THOMAS HOOD,

PRIVATE ROYAL MARINE,

WHO DIED ON BOARD

H.M.S. TENDER INTREPID,

OFF CAPE COCKBURN,

JANUARY 2ND, 1854,

AGED 36 YEARS.

Sacred
TO THE MEMORY OF
JOHN KERR,
GUNNER'S MATE,
WHO DIED ON BOARD
H.M. SHIP INVESTIGATOR,
AT BARING ISLAND,
APRIL 13TH, 1853,
AGED 34 YEARS;
ALSO
TO THE MEMORY OF
JAMES WILKIE,
ICE-QUARTERMASTER,
WHO DIED ON BOARD
H.M.S. TENDER INTREPID,
OFF CAPE COCKBURN,
FEBRUARY 2ND, 1854,
AGED 38 YEARS.

Sacred
TO THE MEMORY OF
JOHN BOYLE, A.B.,
WHO DIED ON BOARD
H.M. SHIP INVESTIGATOR,
AT BARING ISLAND,
APRIL 6TH, 1853,
AGED 29 YEARS.

Sacred
TO THE MEMORY OF
THOMAS MORGAN, A.B.,
OF H.M. SHIP INVESTIGATOR,
WHO DIED ON BOARD
H.M. SHIP NORTH STAR,
AT BEECHEY ISLAND,
MAY 22ND, 1854,
AGED 34 YEARS.

Sacred
TO THE MEMORY OF
MR. H. H. SAINSBURY,
MATE,
LATE OF H.M. SHIP INVESTIGATOR,
WHO DIED ON BOARD
H.M. SHIP RESOLUTE,
OFF CAPE COCKBURN,
NOVEMBER 14TH, 1853,
AGED 26 YEARS.

Relieved from earthly sorrow,
Which on my heart hath press'd,
I thank the gentle hand Divine
Which lays this heart to rest.

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THE END.

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